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The Outlook

A Significant Appointment

ALTHOUGH the principle has been stated often enough, and in spite of the fact that it is now generally agreed that the Royal Air Force has become our first line of defence, there have been few outward signs that correlative measures are being taken to implement that revolutionary change in defence policy.

All the more welcome, therefore, is the announcement by the Ministry of Defence last Thursday that an airman is to replace a soldier as Chief Staff Officer to the Ministry of Defence and as Deputy Secretary (Military) of the Cabinet. The importance of the change is obvious. The German war brought out with almost startling clearness the interdependence of the Services, and if one regards Mr. Alexander as having a Navy bias, it is reassuring that the C.S.O. is now to be an Air Marshal.

As for the occupant of this important post, it would have been difficult to select a man more suitable than Air Marshal Sir William Elliot. Not only has he had a distinguished career in the Royal Air Force, but he served in the Army during the 1914-18 war and was seconded to the Royal Flying Corps. He is thus no stranger to the Army, although his personal experience in that Service may be somewhat out of date.

Previous to taking over Fighter Command from Air Marshal Sir James Robb, Sir William was Assistant Chief of Air Staff (Policy), a post in which he obtained experience which will stand him in good stead at the Ministry of Defence. Nor should it be forgotten that from 1945 to 1946 he was Assistant Chief Executive at the Ministry of Aircraft Production, so that we shall now have at the Ministry of Defence an officer with knowledge of production problems.

During the war Sir William was in charge of night fighter operations at Fighter Command Headquarters, and will thus be in a good position to assess modern requirements in jet-propelled fighters.

America Looks to Her Bombers

NEITHER the Democrats nor the Republicans of America have seriously opposed their President's large appropriation for national and international defence, amounting to half the total of what has come to be known as his "cold war Budget." The decision to maintain an Air Force of only 48 Groups—whereas 70 Groups were authorized by the last Congress—has, however, led to widespread protest, and Mr. Vinson, Chairman of the House of Representatives Armed Services Committee, is convinced that the overwhelming majority of Congress will vote for a 70-Group force to be built up over a period of three or four years.

Conjecture has been rife, since the President's Budget speech on January 11th, as to the significance of the announcement that orders worth £75 million, for jet fighters, medium and light bombers, helicopters and transports, have been cancelled by the U.S.A.F., and that the money will be devoted to the quick building and improvement of long-range Superfortress and Convair B-36 heavy piston-engined bombers. On this matter Mr. Truman observed in his speech that "the size of the 'planes counted more than the number of Groups."

The transfer of funds will not come altogether as a surprise to those acquainted with the scale and scope of the U.S.A.F. bomber programme. Hundreds of wartime and post-war B-29s are being "hatched" from their synthetic cocoons for refurbishing and modification. Of these a proportion are being adapted for aerial refuelling —a British technique which, it seems, will find its first practical military application in America. Meantime, Superfortresses of a new and much superior mark are coming off the Boeing production line and being delivered to Service units, while the Convair B-36s, capable of delivering 10,000 lb of bombs for more than 10,000 miles, are already being flown by squadron personnel. The financial and operational implications of what may

be considered as a production line of Brabazon bombers will not escape the British taxpayer.

That short-range fighters and miscellaneous "utility" types should be sacrificed to expedite the delivery and improve the quality of the bombers which would strike America's first retaliatory blows, is neither surprising nor alarming.

Helicopter Operation

VICIOUS circles are not unknown in aviation and the helicopter field is no exception. The main technical features and problems are fairly well understood by now, but the question arises: how and where are we going to use helicopters? Until some answer is provided designers are at a loss to know the type of craft which will be most likely to fill the bill.

On Saturday next, at the R.Ae.S., Mr. N. E. Rowe will attempt to forecast the sort of organization which is likely to achieve the fullest utilization of the benefits which this class of aircraft can bestow. As Controller of Research and Long-term Development in the British European Airways Corporation he has studied the subject alongside that of fixed-wing aircraft operation, and in his paper one finds many features in common between the two types.

One point stressed in the paper is the proportionally greater effect of winds on schedule-keeping, owing to the lower cruising speed of the helicopter. This also affects annual utilization and therefore the economics of helicopter services. Maintenance has been something of a bugbear hitherto, chiefly because of the need, until more experience is available, for inspections at frequent intervals to see if everything is in order. Mr. Lowe makes the suggestion that this system should be abandoned, and that we should aim at one of sealed servicing, in which components should not be touched until they have completed their service life, when they should be replaced by new parts. This would cut unserviceability from 9½ to 3 days during a 200-hour periodic inspection.

Mr. Rowe goes into the subject of location of "rotorstations" in relation to towns, and puts in a plea for planning elevated rotorstations now, so that the structural requirements of the associated buildings may be met during the planning stage. For point-to-point navigation he comes out as a strong advocate of the Decca track guide system.

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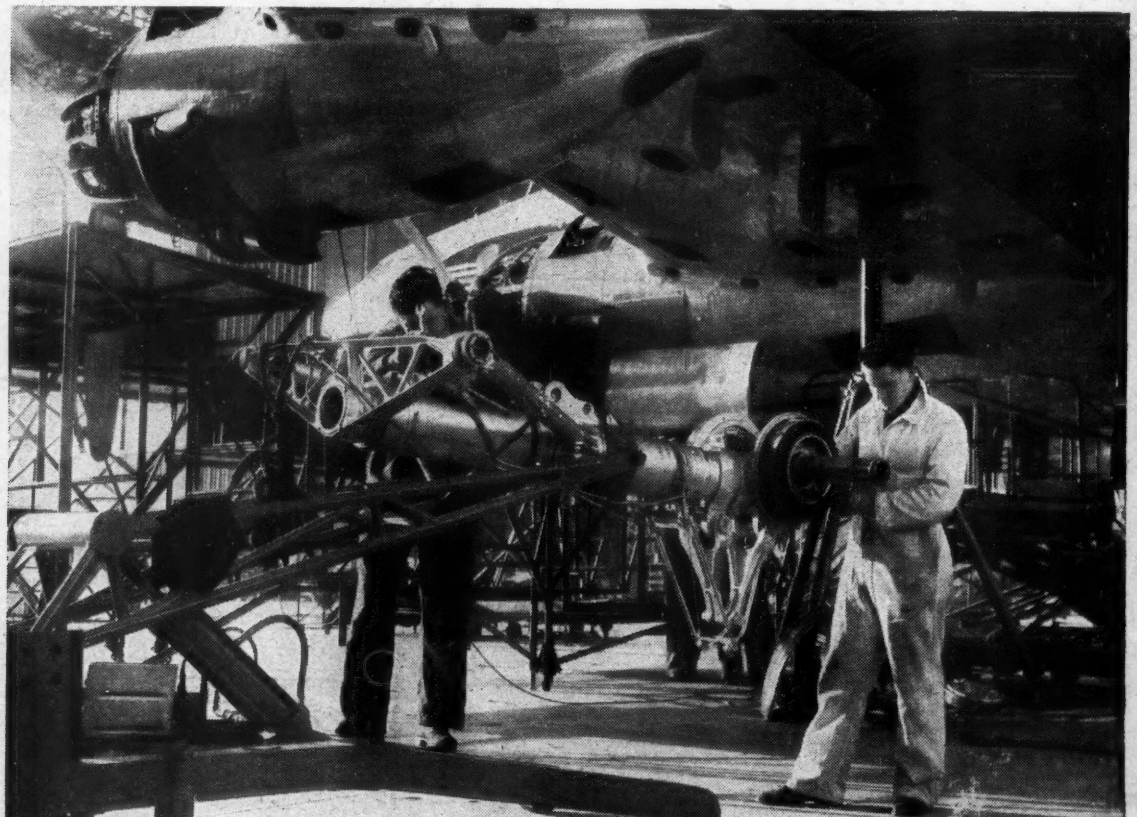


SPEEDBIRD'S NEST: *Preparing to fit a new undercarriage assembly on a Lockheed Constellation in B.O.A.C.'s new maintenance hall at Filton. Until recently, B.O.A.C. transatlantic airliners were serviced at Dorval, Canada.*

A SHOCKING PROBLEM

Details of the Unique Undercarriage Legs Devised by Lockheed for the Cierva Air Horse

TO eyes used to the slim beauty of modern aircraft designs, the ungainly box-and-brace structure of the Cierva Air Horse presents an almost Heath Robinson picture. Yet it is doubtful if any aircraft built has ever been more purely functional in design than this three-legged unwinged Pegasus. Mr. Shapiro, of the Cierva Autogiro Company, in his paper to the R.Ae.S. and Helicopter Association (*Flight*, December 2nd, 1948) gave an admirable exposition of the technical aspects of the Air Horse design, and interest was added by the successful first free flight of the aircraft at Eastleigh on December 8th, under the gentle hands of Mr. H. A. Marsh.

It will, we understand, be some little time before we are able to present a detailed analysis of the Air Horse, but one of the more important features of the aircraft—the unique landing gear—we are able to deal with immediately.

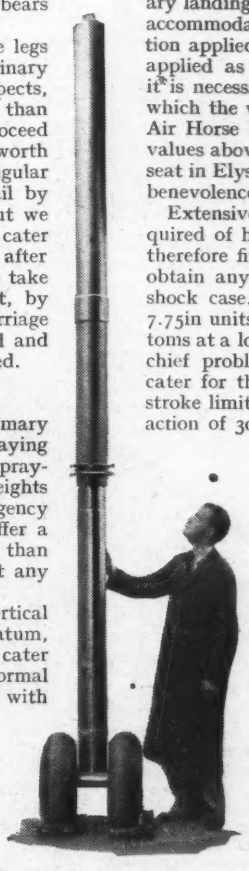
The normal oleo-pneumatic undercarriage is, of course, a very well-known piece of airframe equipment, the essential features of which have not undergone much change for many years, although constant development has naturally resulted both in refinement of design and better performance. But in the main, it can broadly be stated that the orthodox oleo-pneumatic undercarriage leg of today is but a rather more thoroughbred version of its forebears of a few years ago.

This generality, however, does not apply to the legs designed for the Air Horse. The quite extraordinary performance demanded influenced the physical aspects, and the result is a leg which, in all respects other than fundamental principle, is unique. But before we proceed to an examination of the leg, it might be well worth while to review the factors which resulted in the singular performance demands. These are stated in detail by Mr. Shapiro in the lecture already mentioned, but we may here summarise them as being (i) the need to cater for loss of power, which most often occurs just after take-off, when there is little time for the pilot to take effective corrective action; and (ii) the fact that, by building safe emergency landing into the undercarriage instead of the rotor, saving in weight is achieved and the need to impair normal rotor efficiency is avoided.

Designed Dissipation

There is also the aspect that, as one of the primary operational rôles of the aircraft will be crop-spraying (for which it has been given the delightful title of Spraying Mantis) and this involves normal flight at heights of between 10 and 40 feet, the siting of safe emergency landing in the undercarriage would seem to offer a better chance of surviving a sudden power failure than would investing the emergency function in almost any other medium.

For these reasons it was estimated that a vertical rate of descent of 41 ft/sec should be taken as a datum, and the undercarriage was, therefore, designed to cater for this. When, however, it is stated that the normal military aircraft undercarriage is designed to cope with 12 ft/sec, and naval deck-landng types with 14 ft/sec, whilst only the most ambitious of conventional designs get into the 16 ft/sec class, the magnitude of the task confronting Automotive Products, Ltd., in designing the job, may be appreciated. To put it into familiar scale, it means that in a shock landing at 41 ft/sec each of the three legs has to be capable of dissipating energy at the maximum rate of about 70,000 horsepower.



When fully extended, the head of the struct is over 17ft above the ground.

On the basis of past experience of absorption efficiencies which can reliably be achieved, Lockheeds found that a 41 ft/sec rate of descent could not well be accommodated with a leg compression stroke of much below 60in. Necessarily, a stroke of 5ft means that there must be an extension of like amount below the cylinder tube and, as an overlap bearing length between inner and outer tubes when fully extended is required in order to give strength in bending, it meant that the compressed leg length from head to axle centre-line came out at 11ft 5in, whilst the fully extended length came to 16ft 5in.

Structural Factors

Having ascertained the length, diameters were decided by pressure requirements and seal loadings, together with the physical weight considerations which, of course, state that a large-diameter, thin-walled tube will be lighter than a smaller-diameter, thick-walled tube for the same strength. These considerations were, however, coloured by the fact that the cylinder tube is required to act as a structural member of the rotor-support trussing, taking tension loads in flight and compression loads whilst static.

Again, the normal helicopter requirement for ordinary landings is that the shock strut shall be capable of accommodating a combined load of 0.3 vertical reaction applied as a drag load, and 0.25 vertical reaction applied as side load. With a free castering wheel, it is necessary to cater for 0.4 vr in any direction in which the wheel can swivel. The slender length of the Air Horse leg can tolerate the 0.4 requirement at all values above 34in of closure. Leonhard Euler, from his seat in Elysium, must surely gaze down with particular benevolence at Leamington Spa.

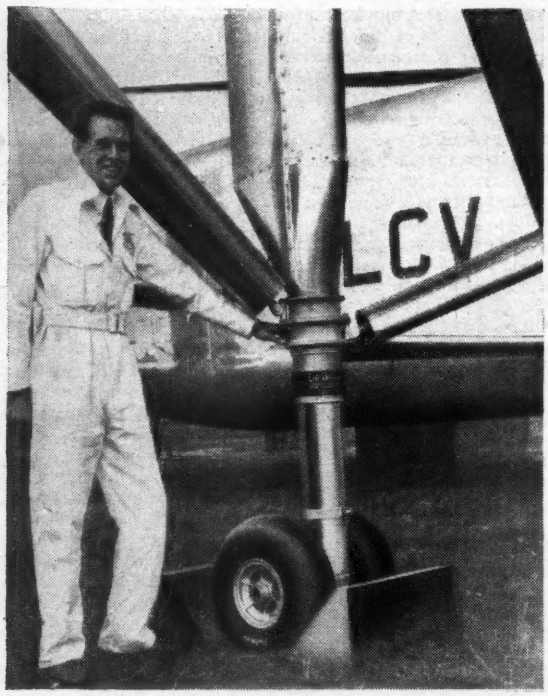
Extensive ground manœuvring is not normally required of helicopters, and the small wheels and tyres therefore fitted meant that Lockheeds were unable to obtain any assistance from the tyres in meeting the shock case. The tyres, incidentally, are Palmer 7.25-7.75in units inflated to 50 lb/sq in, and each tyre bottoms at a load of 7,700 lb, that is 15,400 lb per leg. The chief problem on the energy absorption side was to cater for the 41 ft/sec rate on a stroke of 5ft. This stroke limitation meant that the maximum ground reaction of 30,850 lb (per leg) had to be accommodated over almost the whole shock absorber travel. The designed entropy can be seen in the accompanying family of curves, the value of 30,850 lb being the maximum with which the airframe was designed to cope.

Meeting this requirement involved the provision of variation in damping orifice area over a wide range, and a somewhat complex automatic damping valve had to be evolved to satisfy the conditions. It was no easy task, for the total energy to be absorbed in the 41 ft/sec case is 145,300 ft. lb. per leg, and it is from this factor, against a closure time of 0.226 seconds, that the dissipation value of about 70,000 h.p. is derived. As shown by the curves, the variation in damping orifice area follows closely the retardation of descent velocity, whilst the ground reaction remains virtually constant over the whole closure range. Friction and air reaction remains low up to about half closure, then increases rapidly up to the peak at full closure, the disparity between

A Shocking Problem . . . . .

this curve and the ground reaction curve being a measure both of the efficiency and of the work done by the damping valve.

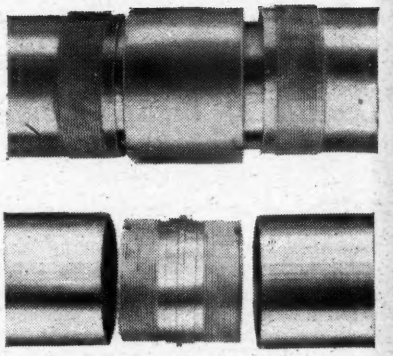
The figures relating to oil displacement in the strut are not without interest: the volume of oil passed through the valve is 500 cu in, and, as this takes place in 0.226 seconds,



Starboard main leg showing how upper part of strut forms a stressed member of the rotor outrigger.

the rate of flow is equivalent to 7.9 gall/sec, or 478 gall/min. These are, of course, mean values; the maximum flow velocity through the valve occurs on the initial landing impact, the flow rate at this time being no less than 860 gall/min—this through an orifice area totalling 0.5 sq in. The pressure generation complementing this peak flow is no less than 3,550lb/sq in.

In common with the provision for emergencies which one finds in all aircraft today, this accommodation in the Air Horse undercarriage for a landing impact at 41ft/sec is scarcely likely to be exercised, for it is equivalent to the free vertical drop from a height of 26ft. It is, perhaps, rather more likely although, we trust, still remote, that emergency landings would be made in autorotative pitch, and in legislating for this condition, it has been assumed that the landing path of the aircraft will approximate to 45 deg, and the equivalent vertical velocity will be 29ft/sec. Catering for this case does not, of course, require the full performance range of the damping valve, and so the unit was designed as a valve within a valve, one half alone being employed for the 29ft/sec case and the whole being used for the 41ft/sec case. There are permanent orifices in the valve which provide for the very slight damping required in performance of the normal "perfect" landings, whilst for progressively worse landings, the first half of the valve will accommodate any bumps up to the 29ft/sec rate.



Detail of threaded sleeve joints in cylinder tube (top), and plunger tube (bottom).

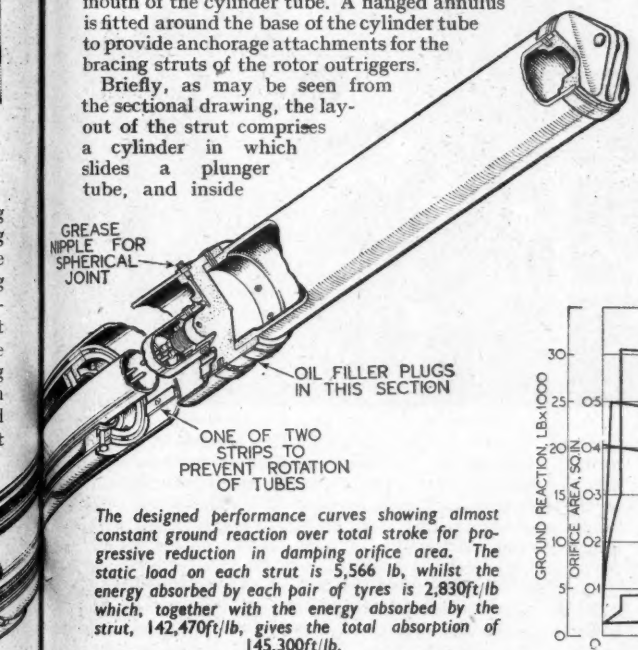
Although the provision of the extraordinary shock absorption characteristics was difficult enough, the design and manufacture of the legs themselves propounded problems of virtually equal difficulty in their own particular way. The cylinder tube and plunger tube are 8ft 4¼in and 8ft 11.84in long, respectively, and of 6.542in and 5.616in diameter, whilst the wall thicknesses are 0.104in and 0.188in. Obviously enough, the machining of these tubes to tolerances of ±0.002in for the bores, ±0.002in for the outer diameter of the cylinder tube and ±0.001in for the outer diameter of the plunger tube, presented no small problem. The machining was carried out by J. L. Jameson, Ltd., of Ewell, Surrey, and the surface finishes are as follows: the upper half of the cylinder tube has an ordinary machined finish externally and a polished bore, whilst the lower half has an ordinary machined finish both externally and internally. The upper half of the plunger tube has a ground and chromium-plated external finish and an ordinary machine-finished bore, but the lower half is ground and chromed externally, whilst the lower ¾-length of the bore is honed.

As the supply position of British steel tubes of the required type meant a delay in delivery of 16 months, the Cierva Company obtained the necessary stock from America, the specification being equivalent to our own D.T.D. 254, i.e., a 75-ton h.t. steel. In addition, the small quantities involved made it necessary to machine them from the hollow billet rather than finish-machine from drawn stock. It was also necessary, in view of the

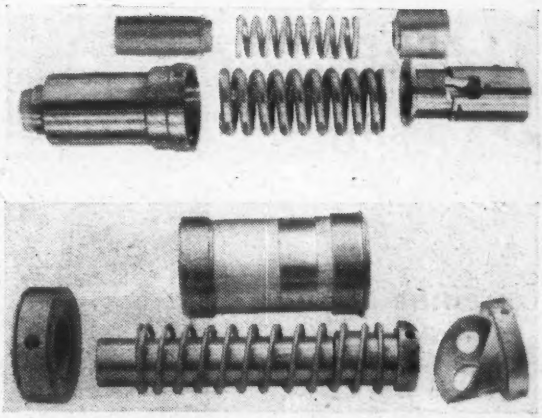
Cut-away drawing of leg showing relative positions of units at 20in of compression. The action of the ram in forcing oil through the damping valve into the oil chamber, so further compressing the air below the separator piston, may readily be followed, together with the physical structure of the leg.

supply and machining difficulties involved, to split both the upper and lower tubes into pairs: this in itself resulted in a knotty joining problem which, however, was solved in a clever and delightfully simple fashion The mating ends are threaded with a two-start Acme-form thread, 8 t.p.i. and screw into unifying Nitralloy sleeves, which are then grub-screw locked to each. Whereas the Nitralloy sleeve is an external fitting to the cylinder tube halves, its complement joining the plunger tube halves is necessarily an internal unit, the meeting lips being waisted to avoid pick-up on the phospher-bronze bearing ring in the mouth of the cylinder tube. A flanged annulus is fitted around the base of the cylinder tube to provide anchorage attachments for the bracing struts of the rotor outriggers.

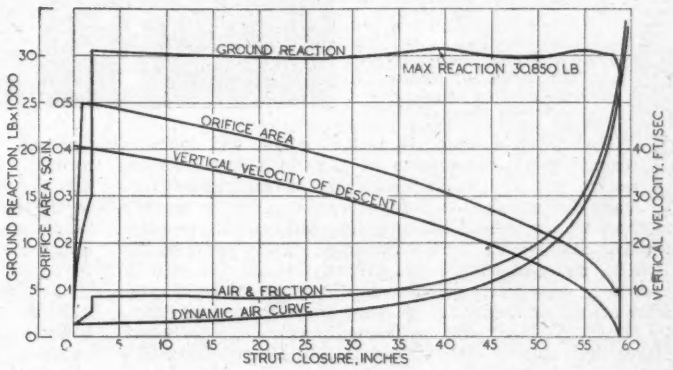
Briefly, as may be seen from the sectional drawing, the lay-out of the strut comprises a cylinder in which slides a plunger tube, and inside



The designed performance curves showing almost constant ground reaction over total stroke for progressive reduction in damping orifice area. The static load on each strut is 5,566 lb, whilst the energy absorbed by each pair of tyres is 2,830ft/lb which, together with the energy absorbed by the strut, 142,470ft/lb, gives the total absorption of 145,300ft/lb.



(Top) Major units of the automatic damping valve, the smaller spring and spools being housed coaxially within the larger spring, valve sleeves and body. (Bottom) In the base of the plunger tube is fitted this spring-loaded cam assembly for self-centering action of the twin wheels.



the plunger tube is a ram cylinder, in the base of which is the automatic damping valve. Co-axially within the cylinder tube, and extending down from the head, is a ram tube which, as the leg is closed, forces the oil in the ram cylinder out through the damping valve into the oil chamber in the lower part of the plunger tube. Below the oil chamber is an air chamber—in the base of the plunger tube—the division being made by a free-floating separator piston.

The action of the strut is as follows: when a load is imposed, the air (the static inflation pressure of which is 140lb/sq in) is rather compressed as closure of the strut causes the ram to force oil from the ram cylinder through the damping valve into the oil chamber, since the increase in oil chamber volume pushes the separator piston down and so compresses the air. The energy stored in this compression of the air tends to reverse the oil flow through the valve as soon as the load is relieved, but at this point, the larger orifices of the valve are then closed and the oil can return to the ram cylinder only through the very small permanent orifices at the base of the valve, and in this manner, full recoil damping is achieved.

Whilst it is true to say that Lockheeds could not well have made a complete success of this particular job had they not previously undertaken considerable experimentation with methods of energy absorption at ultra high rates, there is also little doubt that the *de facto* production of the Air Horse legs has taught many valuable lessons which can only accrue to the advantage of future, more orthodox, undercarriage designs.

NEPTUNES HERE

AT the invitation of the Royal Navy and the Air Ministry, two Lockheed Neptune P2V patrol bombers of the United States Navy are visiting this country. They have already visited the Royal Aircraft Establishment, Farnborough, and Leuchars, and are likely to visit Eglinton, Northern Ireland, before returning to Farnborough *en route* to America.

The Neptunes are of the same basic type as the *Truculent Turtle*, holder of the world's long-distance record with a flight of 11,236 miles from Perth, Australia, to Columbus, Ohio, during 1946. They are used by the U.S. Navy for long-distance reconnaissance and anti-submarine patrol. The engines are two Wright Duplex Cyclone R-3350s, similar to those fitted to the Constellation and Superfortress, and the latest versions are very heavily armed. In the nose are six 20-mm guns fired by the pilot; the dorsal turret mounts twin 0.5in Brownings, and there are two more 20-mm guns in the tail turret. Provision is made for sixteen 5in rocket projectiles under the wing, and the bomb bay is large enough to accommodate sixteen 500-lb bombs, eight of 1,000 lb or four of 2,000 lb. Other possible loads are two torpedoes, each of 2,165 lb, twelve 325-lb depth charges, or an unspecified number of 2,000-lb mines. The electronic equipment is unusually complete and includes not only "search" radar but a radar bomb release system.

The P2V has a span of 100ft, is 77ft 11in long, and has a maximum loaded weight of some 58,000 lb. A top speed of over 300 m.p.h. is obtainable, and the normal range with service load is more than 3,500 miles. With bomb bay tanks this is increased to over 4,000 miles.

An additional distinction held by the P2V is that of being the largest aircraft to take off from an aircraft carrier. Two unmodified machines were used for the carrier trials, the first piloted by Cdr. T. D. Davies, U.S.N., who flew the *Turtle* on its historic record flight. Assisted take-off was afforded by batteries of rockets attached to the fuselage.

DERBY REMEMBERS

Unveiling of Rolls-Royce Window to Commemorate Battle of Britain

Battle of Britain pilots studying the memorial window after the unveiling ceremony.

JANUARY 11th, 1949, is a date which will long be remembered by everyone at the Rolls-Royce Derby works. At no time in the history of the firm have so many distinguished visitors gathered together on one day as those who witnessed the unveiling and dedication of the window commemorating the Battle of Britain pilots of the R.A.F., many of whom were present.

A very large party left London in a special train, and after arrival at Derby the guests were welcomed at lunch by Mr. E. W. Hives, the managing director, who expressed regret that, due to illness, Captain Eric Smith, the firm's chairman, was unable to perform that function. Mr. Hives also explained that the absence of Marshal of the R.A.F. the Viscount Portal of Hungerford, was due to the serious illness of Lady Portal.

Within the limited accommodation available, Mr. Hives said, they had been guided by the Air Ministry in the matter of invitations. They had tried to include representatives not only of the R.A.F., the Navy, and the Allies, but also of Government departments and of the industry. Rolls-Royce regarded themselves, he hoped without impertinence, as part of the R.A.F. The memorial window formed a permanent record of the firm's close association with the Service. Not only so, but the words "our hands" in the inscription on the window (for which Capt. Eric Smith was responsible) were meant to refer to all in the industry.

They Showed Germany Could be Beaten

Sir Archibald Sinclair, replying for the guests, thanked Rolls-Royce for the generous gesture to the pilots not only of Great Britain but of the Dominions and many other countries, who helped to win the Battle of Britain. He paid a tribute to them for the way they had waited day after day and week after week before the battle started. They were remarkable men, and when the fight began they went up in defence, down again to refuel and rearm, and then up again, until the battle had been won. The victory won by these pilots was the first demonstration that Germany could be beaten on this side of the Atlantic. He included in that tribute the ground crews who serviced the aircraft, often under fire, and the staffs in the ops.

Mr. Hives welcomes the guests at luncheon. On his right are the Right Rev. The Lord Bishop of Derby, who dedicated the window, and Marshal of the R.A.F. Lord Tedder, who unveiled it. On his left, Sir Stafford Cripps. Sir Archibald Sinclair (right) replied for the guests. On his right is Marshal of the R.A.F. the Viscount Trenchard, and on his left Lord Balfour of Inchrye.

Derby Remembers . . . . .

rooms, the W.A.A.F. and all the others who had shared in the task. Nor did he forget the inter-service co-operation which had contributed so much.

A special tribute was due to the workers of Rolls-Royce, many of whom had worked 80 hours a week or more in order to give the R.A.F. the Merlin engines it needed. Production was stepped up from 2,000 in 1939 to 7,000 in 1940. For that, much was owed to Mr. Hives, who was a frequent caller at the Ministry of Aircraft Production and Air Ministry, and who was in the full confidence of the Air Council. His drive and imagination were symbolic of the whole British aircraft industry.

Our forebears, Sir Archibald continued, were wise in learning the lessons of Trafalgar. They built up a strong Navy which remained unchallenged for a hundred years. We of our generation must see to it that we learnt the lessons of the Battle of Britain. Our Air Force, in conjunction with America's, must be powerful enough to form a buttress which will convince the most cynical of hard-boiled dictators of the folly of waging war.

A Victory still to be Won

After lunch the window was unveiled by Lord Tedder, who said that perhaps he had some little qualification for that honour in that at the period he had something to do with the technicians who produced the material used by the pilots. One of the real secrets of the victory had been due to the wonderful team spirit, and the mutual faith and understanding, which extended all the way from drawing board and factory to the pilot's cockpit. In that fact lay our hope and our lesson for the future.

In the Battle of Britain these chaps had done their best. He wondered if we were doing all that was in us for the faith, belief and ideals for which they fought. The Battle of Britain was a victory, but not the ultimate victory. Nor were those of El Alamein, Normandy, nor even Germany. That victory still had to be won. We prayed that it might be won without recourse to arms, but be that as it may, we should only achieve it by displaying the spirit which animated these men in 1940. "May we prove equally worthy of our task," Lord Tedder concluded, "and may we achieve the impossible as they achieved it."

Lord Tedder inspects the Rolls-Royce guard of honour, formed by members of the A.T.C.

The window was dedicated by The Rt. Rev. the Lord Bishop of Derby, who was assisted by The Rt. Rev. the Provost of Derby, and by the Vicar of St. Bartholomew's, Nightingale Road, Derby. The solemn ceremony concluded with the singing of the hymn "O God, our Help in Ages Past," with the Benediction, and with the singing of the National Anthem.

After the ceremony many of the guests accepted the invitation to inspect some of the work going on in the Nightingale Road works, the foundries, and the Sinfin establishment. At tea many old friends talked shop or revived memories, and then the special train took them back to London. The day had been a memorable one, and the organization was perfect.

SKYKNIGHT

THE new Douglas XF3D night-and-all-weather jet fighter, named as above, was designed primarily as a deck-landing machine for the U.S. Navy, but reports suggest that its performance on test has proved so satisfactory that the U.S. Air Force is showing interest. A claim that the Skyknight is the most versatile jet aircraft yet to fly seems well substantiated. Its long range and high speed render it suitable not only for fighting, but for attack (with bombs, guns or R.P.s), for reconnaissance, and even for patrol. In the last connection the possibility of flying economically on only one of the two Westinghouse axial-flow turbojets should prove valuable.

Among the novelties of the design is a chute, or slide, which opens on the underside of the fuselage and permits the crew of two (seated side-by-side, Mosquito fashion) to make their exit in safety at high speed. At lower speed, a normal bale-out would be preferred.

Another point of interest is the special system of cockpit lighting, claimed to prevent glare and ensure constant lighting of all gauges and dials. Letters and numbers are etched in transparent lucite on instrument panels and "consoles" and are illuminated from behind with a red light. Failure of a bulb will not mean the loss of an instrument as the remaining lights will continue to illuminate all panels.

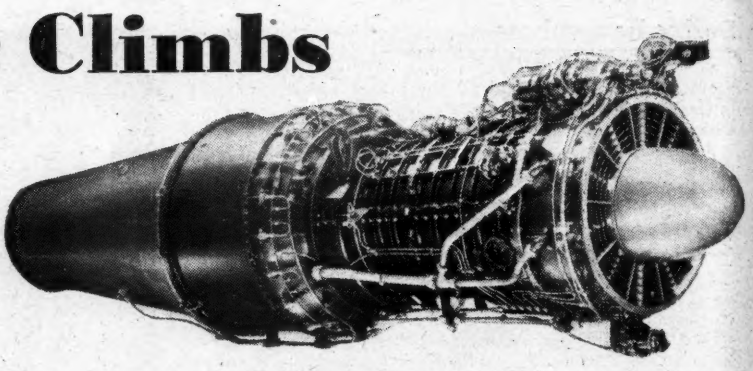
The cockpit is pressurized, and has air-cooling and heating systems. Hydraulically operated aerodynamic braking surfaces are fitted to the fuselage, just forward of the tail, permitting rapid deceleration for deck landings, enhancing combat manœuvrability, and limiting diving speed.

The Skyknight is a remarkably compact machine with a mid-set, square-tipped wing. Its power units are mounted low on the sides of the fuselage beneath the wing, in which position they should be readily accessible for maintenance. Though slower than the larger and more powerful Northrop XF-89 night fighter, to be supplied in quantity to the U.S.A.F., the Skyknight seems assured of a successful career.

FORTHCOMING EVENTS

Jan. 22nd.—Helicopter Association of Gt. Britain: "Helicopter Operations—Some Problems and Prospects," N. E. Rowe, C.B.E.
Jan. 22nd.—Air Scout Movement: Exhibition at Holloway Baptist Church.
Jan 26th.—R.Ae.S. (Preston): "Instrumentation in Flight Testing." Miss B. M. Rimmer, A.F.R.Ae.S
Jan. 26th.—R.Ae.S. (Birmingham) Branch, Presidential Address, Dr. S. C. Redshaw, F.R.Ae.S.
Jan. 27th.—Royal Aeronautical Society: "Radar as an Aid to the Study of the Atmosphere," Dr. F. E. Jones, M.B.E., B.Sc., A.M.I.E.E.
Jan. 27th.—R.Ae.S. (Manchester) "Flight Testing of Civil Aircraft," P. A. Hufton, M.Sc.
Jan. 28th.—R.Ae.S. (Weybridge): Annual Dance.
Jan. 28th.—London Aeroplane Club: Banquet and Ball.
Jan. 29th.—Society of Licensed Aircraft Engineers South Eastern Area Lecture. "Rolls-Royce Power Units," W. P. Calvert, A.F.R.Ae.S. Manson House, 26, Portland Place, London, W.1, at 3 p.m.
Feb. 1st.—R.Ae.S. (Belfast): "The Propeller Turbine Engine," F. M. Owner, M.Sc., F.R.Ae.S., M.S.A.E.
Feb. 2nd.—Royal United Services Institution: "Meteorology in War," Sir Nelson King-Johnson.
Feb. 2nd.—R.Ae.S. (Luton), Discussion Evening.
Feb. 3rd.—R.Ae.S. (Graduates' and Students' Section) "Notes on Fighter Development 1936–1948," Jeffrey K. Quill, O.B.E., A.F.C.
Feb. 3rd.—R.Ae.S. (Isle of Wight) "The Probable Role and Influence of Aircraft in Future Warfare," Air Marshal Sir Robert Saundby, K.B.E., C.B., M.C., D.F.C., A.F.C.
Feb. 5th.—Air Scout Movement: Exhibition at Holloway Baptist Church.
Feb. 7th.—R.Ae.S. (Derby) "Pictures in the Air," C. E. Brown, F.I.B.P., A.R.P.S.
Feb. 9th.—R.Ae.S. (Leicester) "Airscrews," E. Danvers.
Feb. 9th.—R.Ae.S. (Southampton) "Radio Aids," F. R. Wills.
Feb. 9th.—Royal United Services Institution: "Land/Air Warfare," Air Vice-Marshal W. L. Dawson, C.B., C.B.E.
Feb. 9th.—R.Ae.S. (Weybridge): "Civil Air Transport," P. G. Masefield, M.A., F.R.Ae.S.
Feb. 10th.—Royal Aeronautical Society: The Second Louis Blériot Lecture: "French Practical Aerodynamic Methods," Monsieur Brocard and Monsieur Hussenot.
Feb. 11th.—R.Ae.S. (Portsmouth) Short Papers by members of the Branch.
Feb. 11th.—Guild of Air Pilots and Navigators, and Air League of the British Empire: Ball in aid of the Guild's Benevolent Fund and the Air League's Young Pilots' Fund.
Feb. 12th.—Rugby Football Twickenham, Royal Navy *versus* Royal Air Force.

Meteoric Climbs



The Beryl 9-stage axial compressor turbojet.

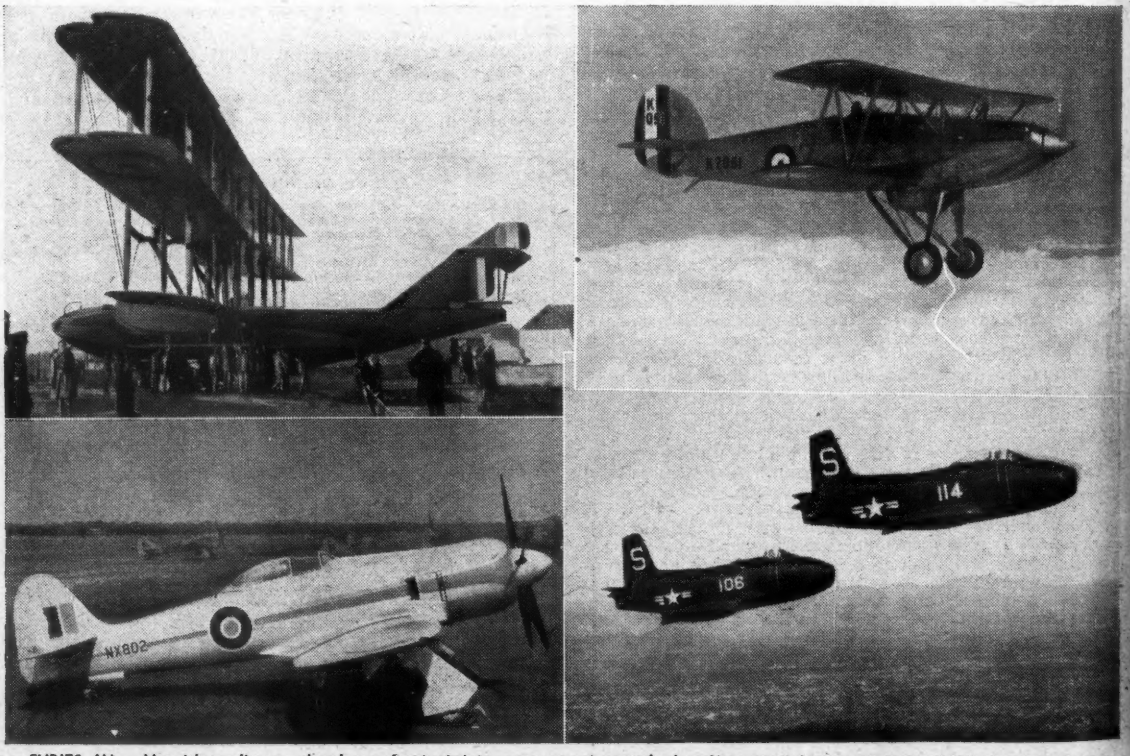
IN the penultimate 1948 issue of *Flight*, that published on December 23rd, we included a paragraph entitled "The March of Climb," giving the times to height of the Gloster Meteor 4 powered with axial-flow Metrovick Beryls in place of the standard Rolls-Royce Derwent 5s. These times were so extraordinarily low that last week, the information was publicized as front-page headline matter by national newspapers. Additionally, in our last week's issue we published a letter from Mr. Eric Greenwood, Technical Sales Manager of the Gloster Aircraft Company, contradicting the times we had given for the Derwent-Meteor to 30 and 40,000ft.

Mr. Greenwood makes it clear that that Derwent-Meteor times of 6.5 minutes to 30,000ft and 11.8 minutes to 40,000ft are at the engine *combat* rating of 14,600 r.p.m., whereas the times we originally quoted of 8 minutes and 17 minutes respectively to these altitudes referred to the *maximum climb* rating of the Derwents, namely 14,000 r.p.m. Whilst the climbs at the Derwent combat rating certainly show an appreciable saving in time over the normal maximum climb rating equivalents, in fairness to the Metrovick Beryl it should be stated that the climb figures we published were made at the *normal climbing* r.p.m. of the Beryl, i.e., 7,600, and not at the combat rating of 7,750 r.p.m.

For purposes of comparison, we tabulate times to height for the Beryl at maximum climb rating and for the Derwent 5 at maximum climb and at combat ratings.

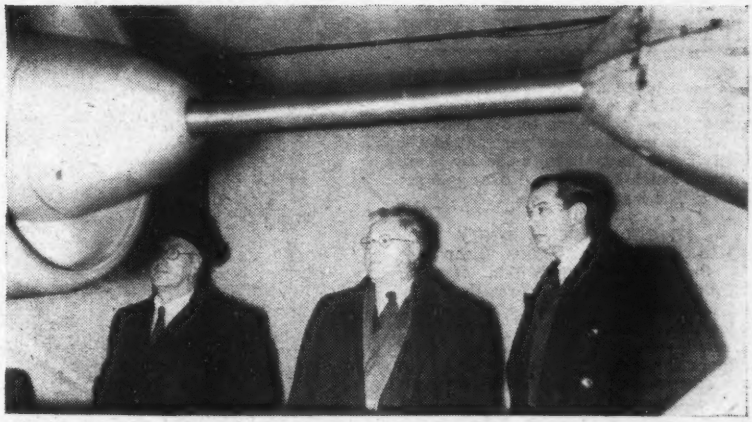
Altitude Feet	Beryl Max. climb Min. sec.	Derwent Max. climb Min. sec.	Derwent Combat Min. sec.
10,000	55	2 0	1 28
15,000	1 35	3 12	2 25
20,000	2 05	4 40	3 35
25,000	2 50	6 40	4 45
30,000	3 43	9 0	6 28
35,000	5 55	12 15	8 30
40,000	7 31	18 0	11 45

Certainly, the maximum static thrust of the Beryl is 3,950lb as against the comparable Service rating of 3,500lb for the Derwent 5, but this is to a certain extent offset by the fact that the Beryl-Meteor did these climbs at an all-up weight of 15,455lb against the 15,175lb all-up weight of the standard Derwent-Meteor.



FURIES ALL: Notwithstanding an abundance of appropriate names as yet unused, aircraft nomenclature is curiously repetitive, as witness this set of photographs depicting four totally different machines bearing the name "Fury". (Top left) is the Felixstowe Fury flying boat—the largest of its class built in this country during the First World War—powered by five Rolls-Royce Eagle engines; (top right) the Kestrel-engined Hawker Fury biplane (originally known as the Hornet), in service with the R.A.F. during the early 1930s; (bottom left) the Hawker Fury I monoplane of to-day (Bristol Centaurus engine); and (bottom right) the North American Fury FJ-1 jet fighter of the U.S. Navy.

HERE AND THERE



NAIAD ON THE BRAKE: During his recent visit to the Acton works of D. Napier and Son, Sir Ben Lockspeiser examined a Naiad airscrew turbine being tested on a Heenan and Froude dynamometer. He is seen here with Mr. H. G. Nelson, managing director (right) and Mr. Sammons, chief engineer (left).

Supermarine's Newest

THE bare fact may now be reported that a new Vickers-Supermarine single-seat experimental aircraft powered by a Rolls-Royce Nene turbojet, is designated by the type number "510."

French Vampires

ALTHOUGH details have yet to be agreed, it may now be confidently reported that de Havilland Vampire jet fighters will be produced in France under licence. Rolls-Royce Nenes, built by Hispano-Suiza, will be installed. Meantime, the French may acquire Goblin-Vampires. Though less powerful, these machines possess qualities which may not be reproduced in the final French version.

Bristol's Egyptian Agents

FOLLOWING the arrival in Egypt of Captain K. J. C. Bartlett, sales director of Bristol Aeroplane Company, it has been announced that Misr Airlines have been appointed sole Bristol agents for Egypt and the Middle East. Arrangements are being made for the joint establishment of a maintenance base for Bristol engines, and for the exchange of technical staff.

Blackburn Apprentices' Presentation

THE 18th annual distribution of merit awards to apprentices at Blackburn Aircraft, Ltd., was held recently and was attended by Mr. Robert Blackburn, who welcomed to the presentation Mr. F. Walker, Principal of the Hull Technical College, and Mr. W. Barnard, head of the Aeronautical Department. Of the 119 successful apprentices the work of J. Fozzard was the most outstanding. He succeeded in obtaining the London External B.Sc. degree in Aeronautics with First Class Honours, his course work whilst at the Technical College being judged the best in the country. The awards were presented by Capt. N. W. G. Blackburn, joint managing director of the Company.

United Flying Clubs' Ball

ORGANIZED by the Association of British Aero Clubs and Centres in aid of their Fighting Fund to make private flying available to the widest possible section of the public, the third annual United Flying Clubs' Ball is being held at the Dorchester Hotel, Park Lane, on March 11th. This Ball has been described as one of the biggest private flying social events of the year, and those who have attended on former occasions will be aware of the extremely high standard which has been set. This year's function will, it is hoped, surpass the excellence of former years. Tickets, price two guineas each, may be obtained from any A.B.A.C. Club or Centre, or the Association at Londonderry House.

Swedish Ejector Seats

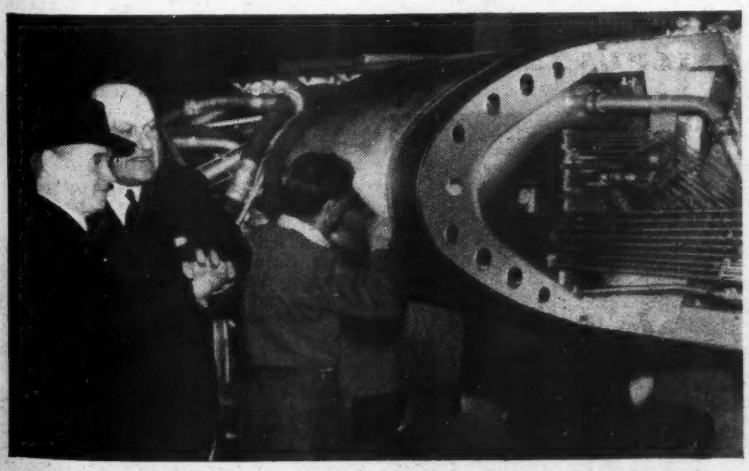
EJECTOR seats are being fitted to SAAB B18B and T18B aircraft of the Royal Swedish Air Force. Although these aircraft are now out of production they will remain in service for at least another two years; both pilot's and navigator's positions will be equipped with this type of seat, which is also fitted as standard to the single-engined SAAB J21A fighter. All new SAAB-built military aircraft, including the latest jet fighters the J21R and the J29, are to be similarly equipped.

Long Distance Bonanza

FLYING a Beechcraft Bonanza equipped with wing-tip long range tanks, a photograph of which appeared in *Flight*, January 13th, Captain Bill Odom on January 14th set up a new distance record for light aircraft (subject to the usual confirmation) by flying from Honolulu to Oakland airfield, San Francisco, non-stop. Capt. Odom, who in 1947 piloted Milton Reynolds, the American pen manufacturer, round the world in 79 hours, had intended to fly the Bonanza from Honolulu to New York, a distance of over 5,000 miles. However, after crossing the coast he met head winds which increased fuel consumption and caused him to turn back to San Francisco. The previous distance record stood at 2,061 miles to the credit of a Russian airman; Capt. Odom's flight covered 2,375 miles and took 22 hours 6 minutes.

The Avro Lift

TO what extent Avro aircraft are contributing to the success of the Berlin airlift, both R.A.F. and civil, is well brought out in the brochure recently published by the publicity department of A. V. Roe and Co., Ltd., called *Avro on the Air Lift*. Profusely illustrated with very good photographs this booklet describes the Berlin supply operations from the Avro viewpoint. Of the Tudors' performance details are given of the outstanding part played by "the aircraft which had been turned down before they



GETTING A GRASP: The Rt. Hon. Arthur Henderson, Secretary of State for Air (nearest camera), photographed with Sir F. Handley Page when he visited the Handley Page factory at Cricklewood on January 14th. The assembly work they are watching is on the leading edge of a Hastings wing.

HERE AND THERE

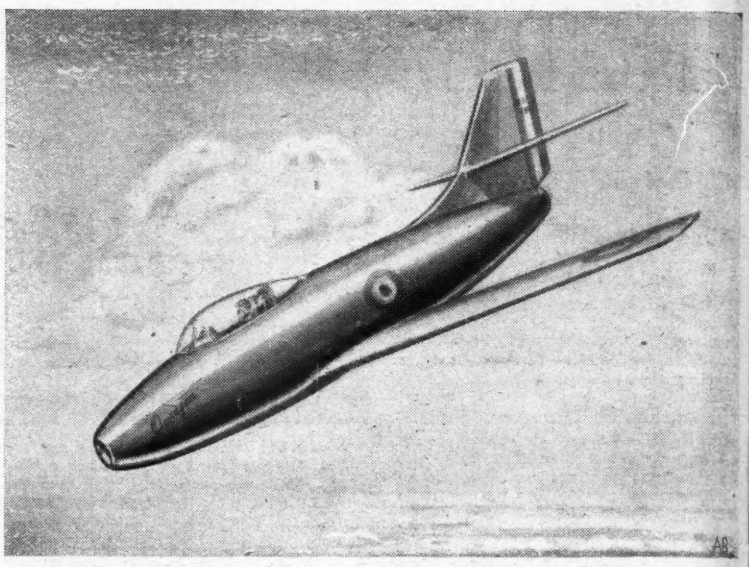
had been given a chance to prove their capabilities in service." It is interesting to note that, according to the Avro calculations, just under 25 per cent of the civil flights have been made by Avro aircraft which have carried over 33.6 per cent of the load.

Aviation Pocket Diary

PUBLISHED by Collins Clear-Type Press, the 1949 edition of their aviation diary contains a wealth of useful information valuable to all who are interested in air travel and flying generally. This year's edition is slightly thinner than the 1948 pocket diary but nevertheless contains as much information as one might expect to find in a much larger directory. Leading air transport operators in all the principal countries are listed besides notes on aircraft, engines, airports, radio and navigation aids, aero and gliding clubs, record flights and model aircraft. Though necessarily on a small scale the coloured maps of the main countries and of B.E.A.'s internal and Continental networks are remarkably clear.

Gliding Awards

THE British Gliding Association national competition cups and trophies which this year were awarded on a points system for flights made throughout the summer, have been awarded as follows: Londonderry cup, to Cambridge University Gliding Club (J. W. S. Pringle); L. du Garde Peach Trophy to Cambridge University Gliding Club; Firth Vickers Trophy to A. D. Smith; EON Cup to C. J. Wingfield. A Conference of Chief Gliding Instructors is to be held by the B.G.A. during the weekend of January 29th and 30th to discuss existing instruction procedure with special reference to insurance rates, the steps which must be taken to enable clubs to continue flying when the new pilots' licences are brought into effect, and the question of two-seater training. The Conference will be held at the London Gliding Club starting on Saturday at 12 noon, and ending on Sunday after tea. Further details can be obtained from the Secretary.



OURAGAN: Bearing the manufcturer's designation Dassault 450, or "Ouragan," (Hurricane), a new French single-seat fighter is nearing completion at the Marcel Dassault works. A Nene turbojet, built under licence by Hispano Suiza, is the power plant, and it will be gathered from the "Flight" drawing herewith that the design has certain features in common with the North American F-86 and Grumman Panther.

News in Brief

OVERSEAS visitors to Britain in November last numbered 18,890; according to the Travel Association's monthly statistics, 74 per cent of these visitors travelled by sea and 26 per cent by air.

* * *

Future film shows to be given by the Royal Aero Club deal with "The Pacific Air Route" on February 15th and "The Hollandia Campaign in Dutch New Guinea, 1944," on March 15th.

* * *

The main R.C.A.F. building at Goose Bay airport was destroyed by fire on January 10th. The damage has been estimated at $250,000, or £62,500 sterling.

* * *

Inter-City Aviation of Boston, Massachusetts have been appointed distributors of the Kaman K-190 helicopter in the New England states. The first K-190 delivered to Inter-City Aviation will be used as a demonstrator and for hire flights as a crop-dusting aircraft.

* * *

A new heavy freight air service was opened recently by Air France; the first machine to land at Orly Airport from Saigon carried an elephant weighing nearly half a ton.

* * *

Trans-Canada Airlines announce the appointment of D. C. Bythell, M.B.E., as director of advertising, and of Stephen Anderson as public relations representative for Great Britain.

* * *

Under the title of J. W. Lawrence (Canada), Ltd., a Canadian subsidiary of J. W. Lawrence, Ltd., heat exchange engineers, has been formed and has premises at Montreal Airport. Oil coolers, aircraft radiators and other heat exchange equipment is to be manufactured there in addition to reconditioning of such equipment.

* * *

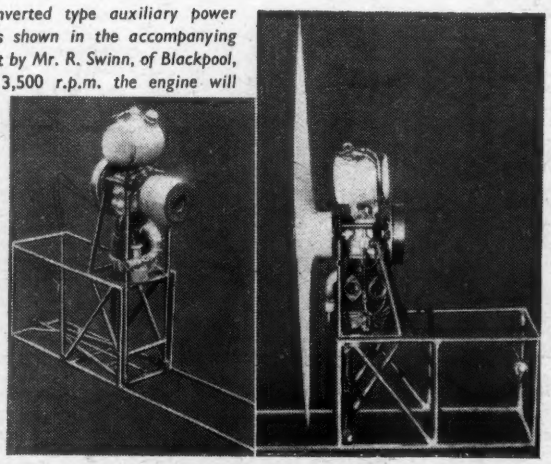
First post-war air carriage of newspapers to the Isle of Wight began on January 3rd when Somerton Airways, of Cowes, flew bundles of *The Southern Daily Echo* from Southampton airport direct to Cowes. The journey took ten minutes and the newspapers were on sale within 25 minutes of leaving the mainland.

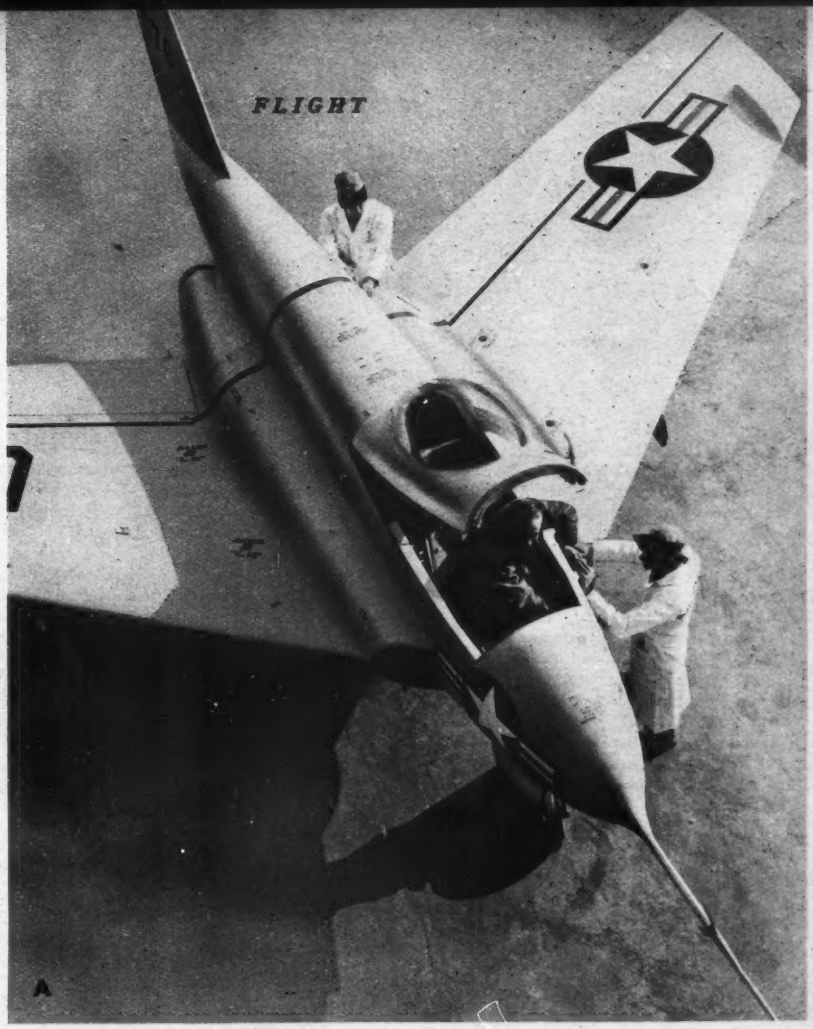
* * *

Mr. Hanford Stevens, London Representative of the Division of Aircraft Production (Australia), will be returning to London by air this month and will be accompanied by Mr. V. F. Letcher, director of the Division of Aircraft Production in Australia. Mr. Letcher is coming to London in connection with Australia's future aircraft production programme.

POWER FOR SAILPLANES

THE single-cylinder inverted type auxiliary power plant for sailplanes shown in the accompanying photographs is being built by Mr. R. Swinn, of Blackpool, who estimates that at 3,500 r.p.m. the engine will develop 10 h.p. It is intended to attach the unit, which at present weighs 57 lb, to the sailplane's wing root fittings, presumably in a pusher installation, and use it to reach a safe height without winch assistance before retraction. The same idea was tried many years ago in the Carden-Baynes sailplane designed by Mr. L. E. Baynes.

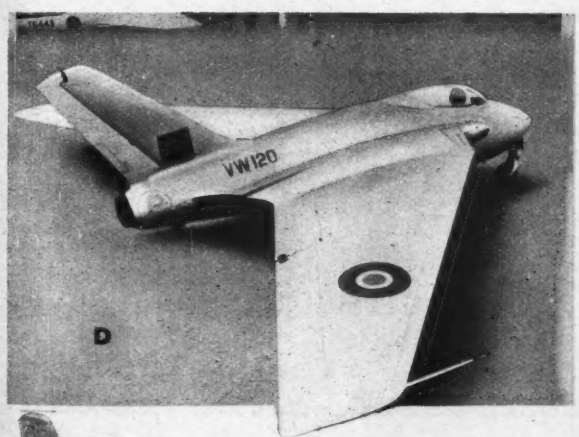


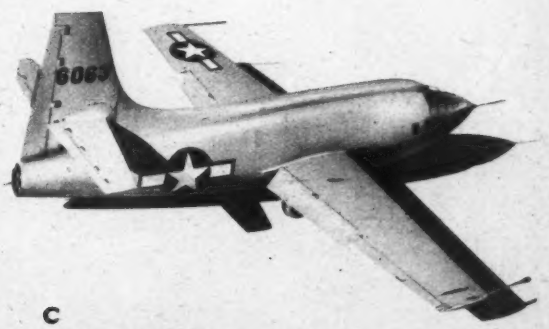


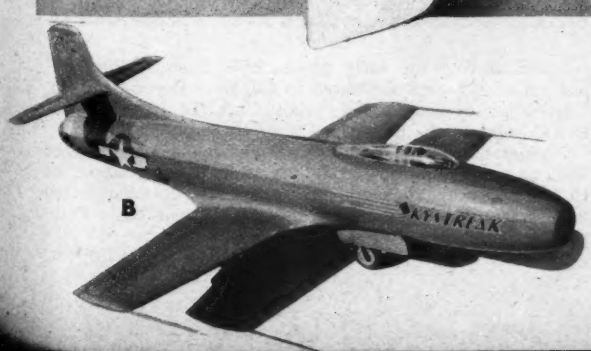
OF the five high-speed research aircraft depicted (four American, one British) three have already achieved supersonic flight, but only one—the rocket-propelled Bell X-1— has accomplished this in level flight. The X-1 (C) is air-launched and is unofficially credited with a Mach Number of 1.4—a figure which may be far exceeded in the immediate future. In the Douglas Skyrocket (E) both a rocket and a turbojet are fitted, but the circumstances under which this type lately reached "Mach 1 plus" are not yet known. It represents a notable aerodynamic advance on the turbojet Skystreak (B). The Northrop X-4 (A) has only lately made its first flight and is powered with two turbojets with afterburners.

Our own de Havilland 108 (D) is remarkable in having attained level speeds of the order of 630 m.p.h. on the relatively low thrust of a Goblin (output unspecified), and for its low wing loading and amazing handling qualities. In the hands of Mr. John Derry the "108" has exceeded a Mach Number of 1.0 in a dive.

SOUND INVESTMENTS







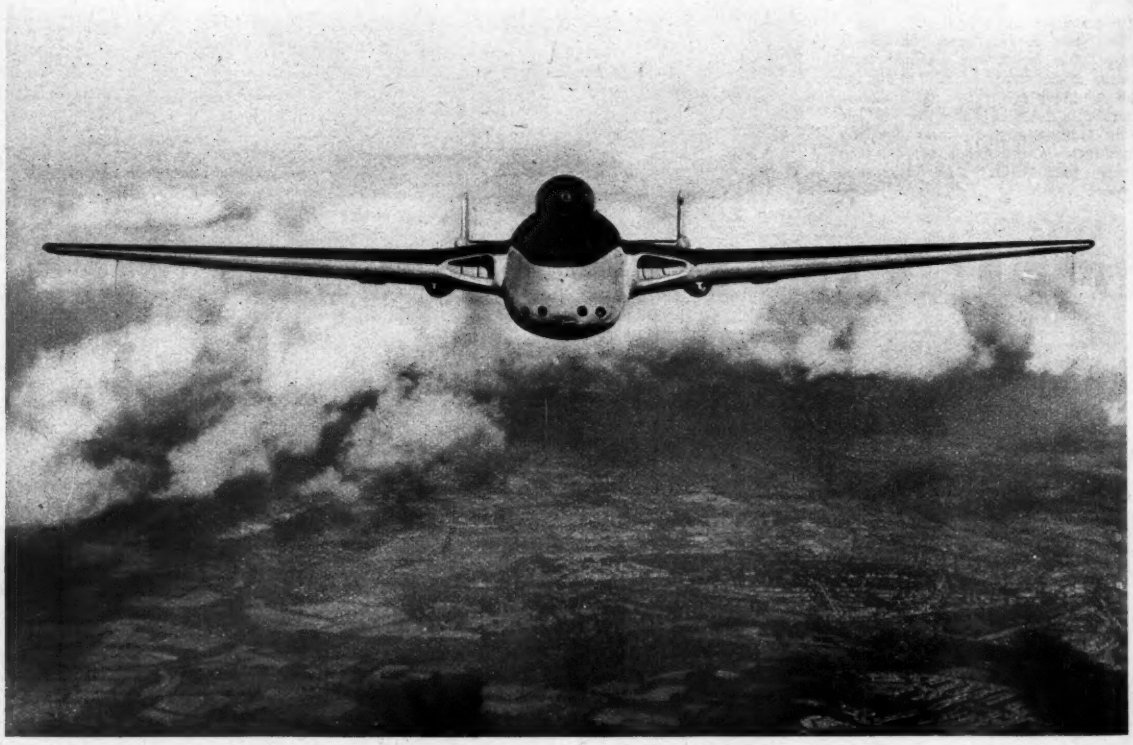
Naval Jet

Characteristics of the de Havilland Sea Vampire Mk. 20 Deck-landing Fighter : Range of 1,145 Miles

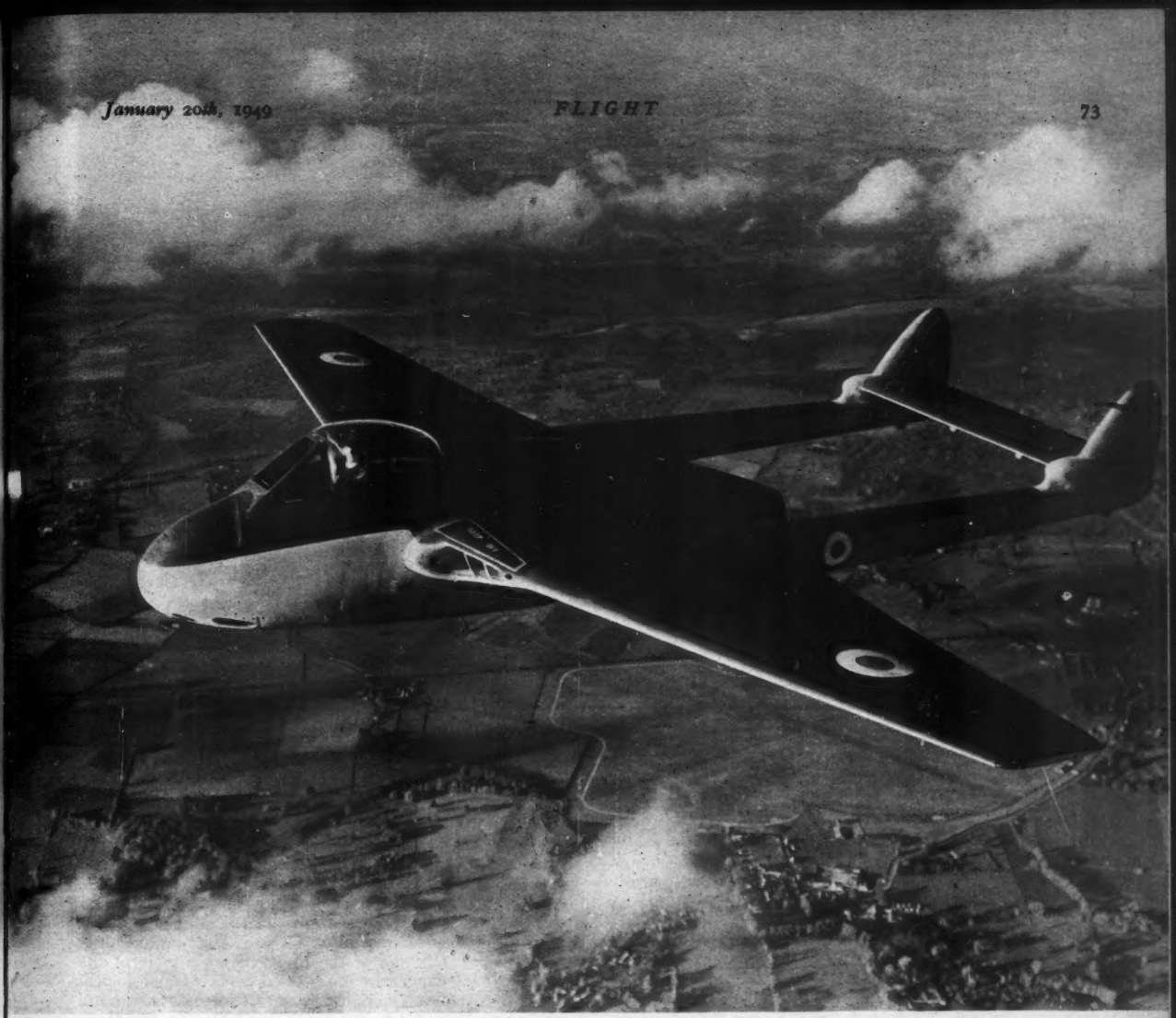
DESIGNATED in full, D.H.100 Sea Vampire F. Mk. 20, the carrier-borne development of the de Havilland Vampire now in production for the Royal Navy differs appreciably from its shore-based counterpart, the Vampire F.B. Mk. 5. Both types are powered by a Goblin 2 turbojet of 3,000 lb static thrust and have the short-span (38ft) wing, but the Naval machine is characterized by dive-brakes and flaps of increased area and is fitted with an arrester hook. This latter is of distinctive design, being attached to the wing-root ribs and faired into the tail of the nacelle, above the jet pipe. Take-off is normally deck-accelerated, and hooks for the accelerator bridle are standard fitments. The total fuel capacity (including two 100-gallon drop-tanks) is 530 gallons, which brings the all-up weight to 12,660 lb. A provisional weight break-down follows: Structure, 3,030 lb; power unit installation, 1,890 lb; guns and armour, 860 lb; ammunition (600 rounds), 375 lb; radio, 110 lb; fuel system, 560 lb; miscellaneous items, 1,173 lb; pilot, parachute and dinghy, 218 lb; internal fuel, 2,674 lb; drop-tanks and external fuel, 1,770 lb. The structure weight is quoted according to the de Havilland definition, and excludes canopy, cockpit equipment, flying and engine controls, hydraulic, electric and pneumatic gear, engine mountings and cowlings.

At sea level, the patrol duration is two hours at 220 m.p.h., but at 30,000ft and 350 m.p.h. this is increased to 2.35 hours. The still air range (defined as the range with allowance for fuel used in take-off, climb and descent, the distance covered on climb and descent being included) is 590 miles at sea level, cruising at 350 m.p.h.; at the same speed, but at a height of 30,000ft, the range is extended to 1,145 miles, illustrating the advantage of high-altitude operation with an aircraft of this type. Without assistance, the take-off distance to 50ft is 1,310 yards. The top speed is 457 knots (526 m.p.h.), and the time of climb to 25,000ft (combat power; no external equipment) is 10 minutes.

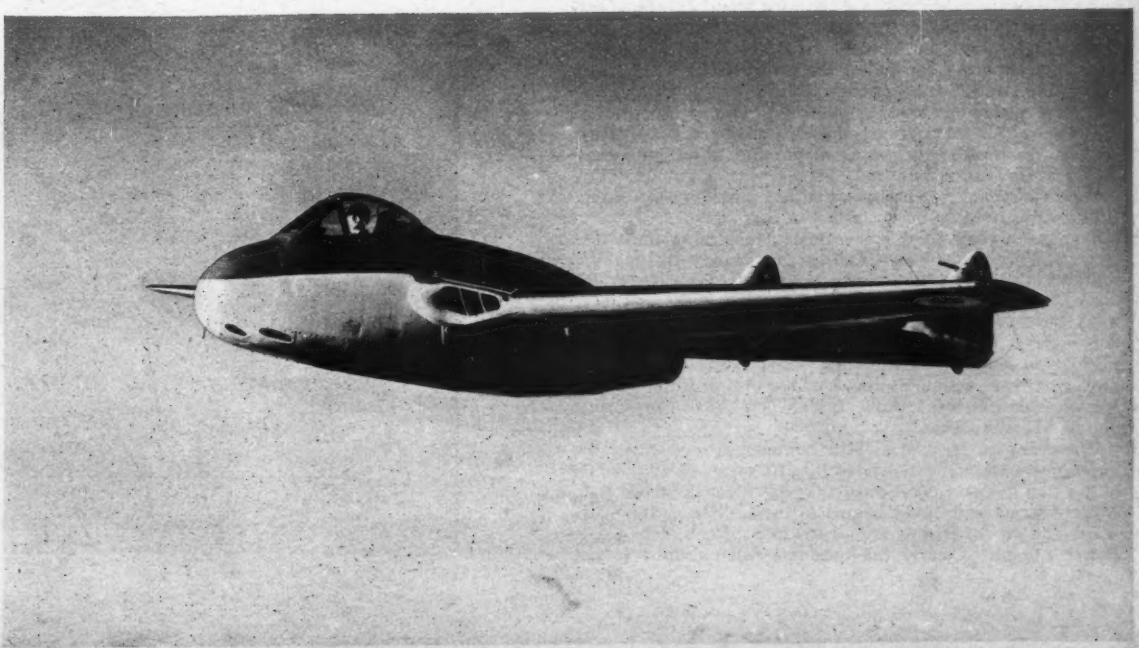
In performance and overall efficiency the Sea Vampire 20 is much superior to the prototype "LZ 551," a modified Vampire, which on December 3rd, 1945, made fifteen successful landings-on, and take-offs from, H.M.S. *Ocean*, thus achieving the distinction of being the first pure-jet aircraft to operate from an aircraft carrier. Sea Vampire 20s, similar to the example depicted (except that this particular machine is flying without its arrester hook), were operated during the early phases of "Exercise Sunrise" last year, and were illustrated in *Flight* of December 16th. Two pilots of the Carrier Trials Unit (Lt. G. Baldwin, D.S.C., and Lt. K. Shepherd) made over 200 landings.



No details of Sea Vampire variants subsequent to the Mk. 20 are available, but it has lately become apparent that important development possibilities, unsuspected even a few months ago, may be latent in the basic Vampire design.



The disposition of the Sea Vampire 20's four 20 mm guns and the cross-section of the clear-vision "bubble" canopy are admirably brought out in the head-on view opposite. The latest Naval camouflage may be studied above, and, below, the lines of the compact nacelle are sharply defined against a clear sky.



SOARABLE AIR

Thermal Prospects for the Glider Pilot over Great Britain

By JACQUES COCHEMÉ, A.F.C., B.Sc.

THE purpose of this article is to discuss the kinds of British atmospheric conditions which lend themselves to thermal soaring flights with a sailplane. These variable conditions hold, for pilots of different aptitudes, the promise of different achievements. At one end of the scale there are the holders of a "C" gliding certificate who, having learnt to take off, land and control a glider in the air, are getting ready to seize the opportunity to achieve the five hours of duration, one kilometre in height and fifty in distance, which will give them the silver badge to which they aspire. Next comes the majority of confirmed British soaring pilots, silver "C" holders, now 200 in number, who, given adequate conditions, will have no difficulty in exceeding again the silver "C" standards, but whose experience and aptitude for spiral climbing and navigation in cloud are limited. From this honourable collection few are the wizards, or potential wizards, who might be expected, owing to their ability, to fly in deep cloud amidst unpleasant conditions of icing and turbulence, retaining meanwhile an idea of their ground position.

Between this select group and the mass of fair-weather soarers, the proficiency necessary to climb three kilometres and soar for three hundred, which wins a golden "C," occupies a somewhat intermediate and ambiguous position, which will presently be examined in more detail.

To give a basis to this discussion, something must first be said of the nature of thermal soaring, and of its medium, soarable air. Thermal soaring is the art of gliding at the very low sinking speed of a sailplane, in air that is going up faster than the machine is descending through it because it is warmer, and consequently lighter, than the surrounding atmosphere. This buoyancy is produced by uneven heating of the ground by the sun, because of differences in colour, texture, vegetation, orientation and many other details at its surface.

The rising currents of air, or thermals, are cooled by the expansion caused by the reduction in pressure at the rate of 5.4 deg. F per 1,000ft until they are fully saturated with water vapour and cloud begins to form. From there upwards the rate of cooling is reduced to approximately 3 deg. F per 1,000ft. Clearly the thermals will continue to rise so long as they remain warmer than the air at their level. The vertical distance over which an initial temperature difference will be maintained depends on the distribution of temperature with height of the surrounding air. This distribution is measured regularly by means of radio sondes and aircraft. It is one of the most valuable tools of the forecaster, and can easily be plotted on a Meteorological Office form called a Tephigram when, if forecast maximum temperatures for the day are also available, the depth of thermal ascent can be assessed graphically. Air within this depth is spoken of as unstable—a glider pilot might say soarable.

Every morning representative ascents and forecast temperatures are broadcast on the Airmet frequency to help

soaring pilots decide whether joy is obtainable. In the use of this simple and accurate device some caution is needed because of differences, not only of location but also of time; the ascents given on the broadcast may not be representative of the area over which it is intended to soar.

Cross-country thermal soaring flights are made by circling in thermals to gain as much height as possible (or as necessary), and then moving on to another thermal, losing again on the way as little height as possible or as necessary—the two do not always coincide. Several ingenious rules have been evolved and tables computed to find the most efficient forward and sinking speeds applicable to the various portions of the air and their different conditions. Clues leading one to expect the presence of thermals are found in the physiognomy of the sky, with its clouds and the aspect of the ground.

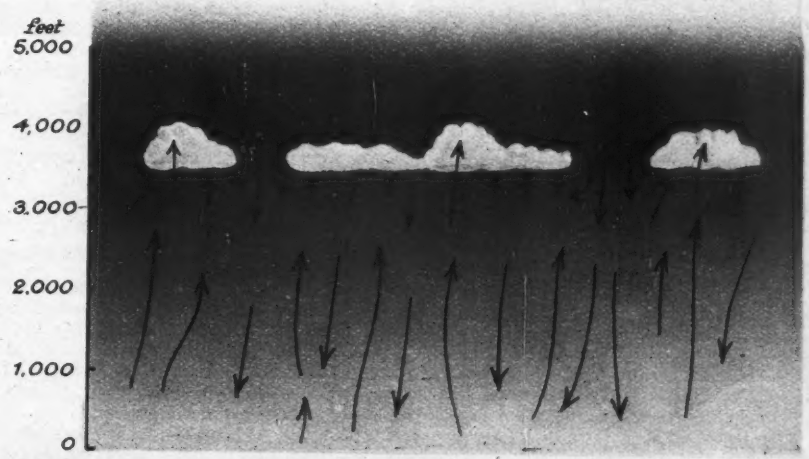
Soaring Possibilities—with reservations

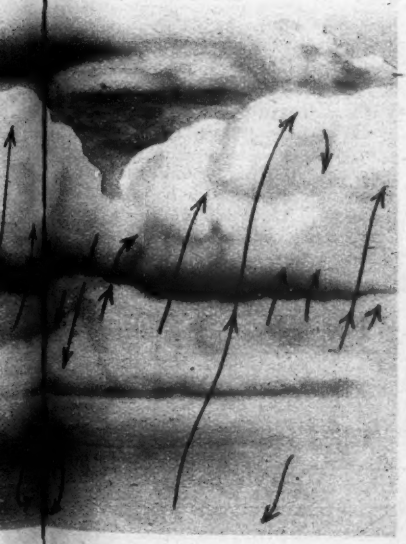
So much for soarable air and soaring. Let us now assume that fair sampling of the air in which soaring is intended has been achieved and soarability assessed. It is then natural amongst glider pilots to make their enthusiasm for the potentialities of the day directly proportional to the depth of the soarable layer. If that depth is 4,oooft they say that it is not very good; if it is 8,oooft it is good enough; 15,oooft is wonderful and 20,oooft terrific.

This simple view cannot be accepted without the most stringent reservations. There is no doubt that, if one wishes to gain height by thermal soaring alone, the top of the unstable layer is the limit. But the reservations I have in mind spring from the limits set by the severity of the weather. To these reservations I shall give concrete expression right away by stating what I consider is the most important proposition in this essay; for the bulk of soaring pilots there is an optimum depth of soarable air for cross-country thermal flights which I would put at 6,ooo and certainly not more than 7,oooft. In so saying, I must, once more, emphasize that I am discussing the conditions prevailing in this country.

Several fairly straightforward meteorological reasons will be given for thus grudging the soaring enthusiast room in the vertical in which to manœuvre. Because complete experimental evidence is as yet far from available, I shall assume certain things and make generalizations. The first assumption is that the horizontal space between the ascending currents is proportional to the depth of the unstable layer. This assumption is both bold and fairly obvious. It is bold when it implies the simple symmetry of cellular circulation; a candid generalization which the complexity of nature defies. At the same time it is obvious to expect that, when more room is allowed, movements should be on a larger scale.

The two diagrams on these pages demonstrate most effectively the differences, in both formation and frequency, between conditions encountered in layers of soarable air extending to 6,000ft (lower left), and 4,000ft. As explained in the text, thermals are more frequently and more easily contacted in the 4,000ft layer, but the "streets" of cumulus in the deeper layer offer better cross-country prospects to the average pilot. Conditions approximately similar to those depicted in the sketches are portrayed in the accompanying photographs of soaring activity.





Secured during the International Contests at Samedan last year, this fine study illustrates both the promise and the peril of Alpine gliding.

SOARABLE AIR . . .

The Official Truth, which will gradually and prudently emerge from the data on convexion phenomena now being accumulated, especially in the United States, is probably that the simple cellular pattern is there, as a framework, more or less hidden by a number of auxiliary currents due to local idiosyncrasies of the ground or to secondary circulations. Similarly, on our western shores the very long rollers caused by violent cyclones in the middle of the Atlantic Ocean arrive mixed with many other trains of smaller waves which, although they may obscure it, do not cancel their vast movement.

This to a certain extent is illustrated by the barographic records illustrated of two slope soaring flights over the Dunstable Downs in unstable layers of widely differing depths.

From this first assumption, and from what has been said about soarable air and soaring, it follows that the taller the soarable air, and the wider its gaps, the higher it is necessary to climb in order to bridge these gaps safely. I would express this in a general thermal soaring rule and say that in order successfully to go across country by thermal soaring it is necessary to climb to at least three-quarters of the depth of the soarable layer. This rule has the weakness of any such generalization. It is open to severe or even indignant criticism based on bona fide individual cases. It needs the massiveness of statistical evidence, which is not, at this juncture, forthcoming.

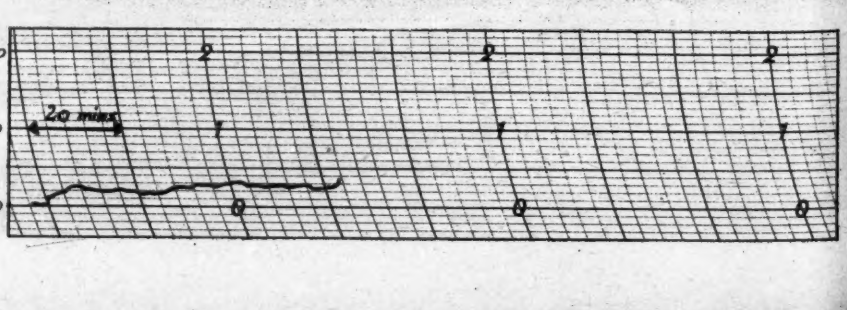
I now propose finally to explain my meaning by describing typical conditions within unstable layers of increasing depths. However, before this is done two important factors which greatly influence thermal soaring performance must be discussed so that they might be eliminated from amongst the variables, and come under the heading: all other things being equal. The first is the humidity of the air within the soarable layer and immediately above it. This humidity controls the height of the condensation level and the cloud coverage of the sky.

Let us assume that in the several layers to be discussed the water content of the atmosphere is such that the condensation level is 3,500ft and that, over a reasonably large area, not more than half of the sky is covered by clouds. The second important factor is the wind. There is no doubt that in most flights the wind carries one most of the way. But there is another important respect in which the wind affects soaring flights: within a certain speed range it promotes the formation of cloud "streets," these providential trade winds of the sky. Let us, therefore, add to the cloud conditions which I have stated a gradient wind of 25 knots; and start with a consideration of a layer 4,000ft thick.

Disadvantage of the Shallow Layer

There pleasant conditions are met; thermals are frequent and many are earth bound, easily contacted at low height. The cloud is thin and there are short streets with few bands of continuous lift. All this is marred by the precariousness of the going. The margin of reserve height and time in hand is not sufficient. Assume that the pilot has climbed to the top of the layer and that he starts gliding down on course; within five minutes, at 3,000ft just below cloud base, and whilst having a good look round, his position is already precarious. If he sees something promising two miles ahead and goes for it, he will be nearer to 2,000ft than 3,000ft by the time he gets there. And if he has been led up the garden path his situation becomes serious. Another such mistake and he has to start thinking about landing places. He may then see promising clouds or patches on the ground likely to generate thermals, but, alas, they are out of gliding range. Meanwhile, more height is lost, and only a chance meeting of a young thermal can waft him up again. Although good flights have been carried out in such a thin layer, great skill and luck is required and there is no time for relaxation.

Let us now increase the depth to 6,500ft, and the first obvious advantage if again one assumes climbing to the

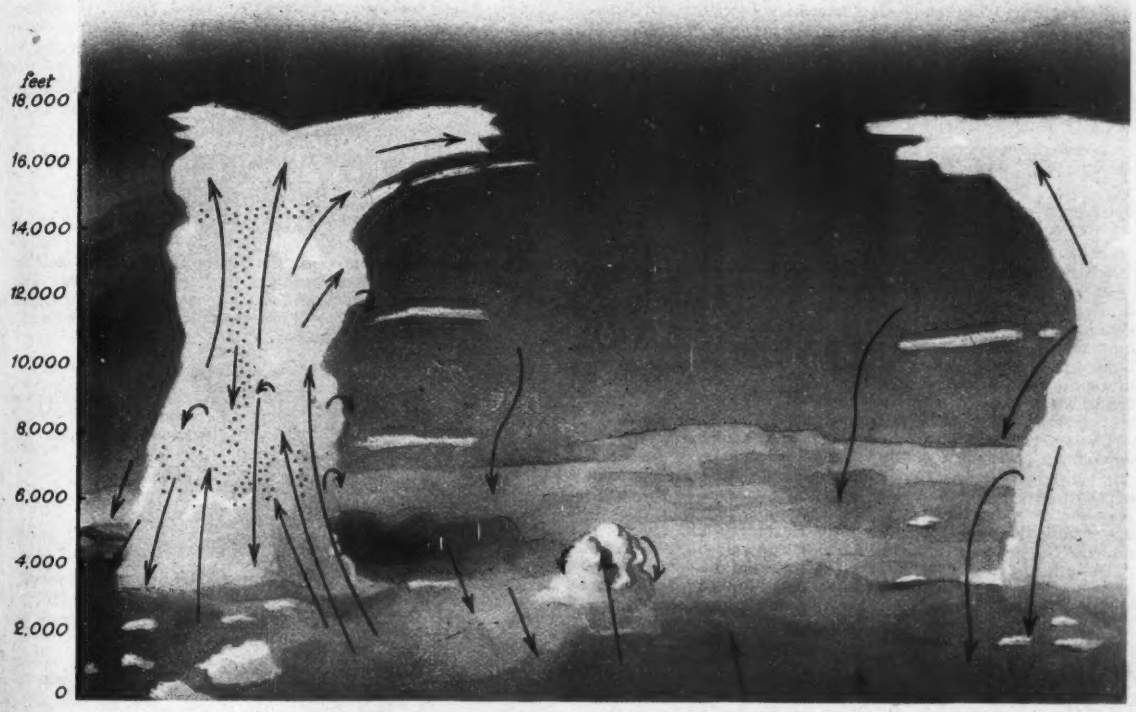


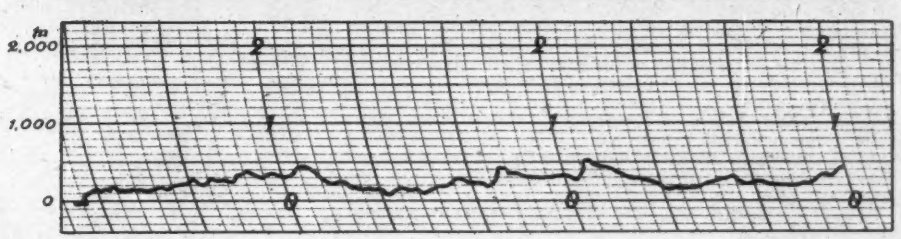
Tracing of the barographic record of a soaring flight over the Dunstable Downs from the time of launching by winch to 90 metres to the moment when height was gained by circling in a thermal prior to soaring away. The depth of the soaring layer was 3,600ft, and the flight level fairly constant around 800ft.

top of the layer, is that the harassing urgency of this hand-to-mouth floating in the sky has considerably decreased. It is true that, as I have postulated, the intervals between the thermals themselves are wider, but the intervals between the notches on the time scale are the same. It still takes twenty seconds to describe a thermal soaring circle; and if a likely area proves fruitless several more can be tried before resigning oneself to the sobering wait for the retrieving crew.

The clouds themselves present a much more fruitful picture; they are deeper. There are chubby cumuli with flat bases and cauliflower bodies. Inside these a good deal of energy is liberated by the condensation of water, and in addition to a thermal push from below there is also a cloud "suck" from above. Quite a time can be spent in comfortable shallow circling below one of these cumuli if contacted at the right time in its life history. Such conditions invite cloud-flying in a mild and relatively easy form. The bottom of the cloud is at such a height that, should one fall through it there is plenty of room to tidy things up. One is never very far from clear air which can be reached in a short while, either by straightening out or opening

The "cutaway" below exposes the turbulent air conditions inside a cumulo-nimbus "anvil" formation extending to 18,000ft. Icing zones are represented by dots. On the right is evidence of the deceptively calm exterior of such a cloud.





Three hours over the Downs at the bottom of 25,000ft of unstable air. An hourly rhythm in the flight level is discernible. Two steep climbs at the end of the second hour are due to circling in thermals.

SOARABLE AIR . . .

the dive brakes according to the degree of failure. During the soaring season icing at these heights is unlikely.

With this depth of soarable air the cloud streets properly come into their own; beautiful massive bands, stretching for miles, with a slightly beady structure to relieve the monotony. They seem to have developed a circulation of their own and steady lift is found along their flank, punctuated, here and there, by small areas of down-draught with improved lift in close attendance in which to circle and regain height. This is certainly the best depth of soarable air for thermal cross-country flights by the average pilot. I am not quite sure that it is not the best for all pilots when racing against time. It is certainly good enough for a gold "C" distance, and the only native one to date was done in it.

Very different, not only in size but also in structure is the cloud picture presented by, let us say, a soarable layer 18,000 feet deep. The tall clouds have taken on the proper cunim shape. They extend well above the freezing level and precipitation takes place in the form of showers. The rhythm of vertical movement of air is vast, and there are wide gaps without thermals. The shower clouds tend to congregate in line squalls or cold fronts; this arrangement of the great amount of energy released by condensation tends to concentrate the strong lifting power in narrow bands, and further enlarge the areas where no lift is met.

In the vicinity of these bands, strong downdraughts are encountered, and this wholesale churning of the air causes the wind to blow irregularly, both with regard to strength and direction. The suggested necessity to climb to three-quarters of the height of the soarable layer is therefore all the more imperative if dead areas are to be crossed. This involves protracted blind flying in clouds containing heavy rain, snow flakes and sometimes hail. Supercooled water appears to be omnipresent and icing of the airframe and pitot head a common occurrence. At low heights, below cloud base, itself varying much on either side of the average 3,500ft because of the redistribution of water by precipitation, the essential cloud structure hidden by the large grey pedestals of the cunims and the great number of low fragments cannot be discerned. It is true that clear areas are found in the wake of cloud-bursts, but, in these, the lift is mostly poor.

It is only by climbing sufficiently high through a towering cloud, and coming out into clear air through the side of it, that a more intelligible view is obtained. This arduous task must be repeated again and again in order to cover a lot of ground. With the equipment at present available this is beyond the ability of the average soaring pilot. The men who can fly thus are truly in the very top drawer of motorless flying. There is no better example of it than the flight which secured for Axel Persson the championship of the world at the F.A.I. Competition in Switzerland, during which he climbed repeatedly to great heights whilst doing a goal flight from Samedan to Geneva.

The attainment of the gold "C" conditions is, for men like Persson, only a matter of opportunity; given enough soarable air they will take it in their stride. But this achievement is well within the reach of lesser pilots. So far as the distance is concerned, I have already implied that 6,000ft of unstable air is sufficient; and for most people also best. In this country the limiting factor is that we are terribly cramped for space; and many a good flight has had to end because it had run out, not of thermal power, but of land. As for the height, if it is to be done by thermal soaring, difficult cloud flying is definitely involved. But there is a world of difference between steeling oneself for one grim ascent and purposely ploughing through a series of cunims, these buldozers of the sky. There again, to do the 10,000ft required, 11,000ft are sufficient and easier to cope with than 20,000ft; the accelerations are smaller and, with luck, icing might be avoided.

A companion article by the same author will be published shortly.

AMERICAN AIRSCREW ADVANCES

Separate Self-contained Hydraulic System

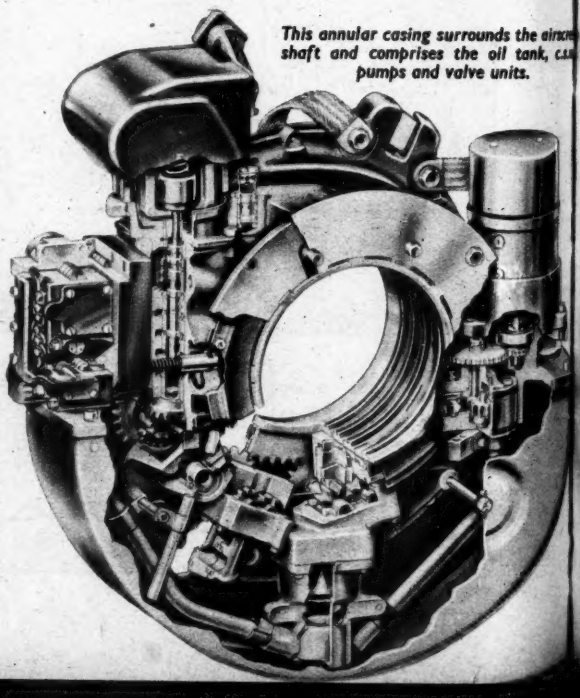
An interesting new development in airscrew technology has recently been announced by the Hamilton Standard Propellers Division of the United Aircraft Corporation. Whereas the conventional hydraulic airscrew is actuated by oil tapped from the lubrication system of the engine, and is thus limited to a certain extent by the prior considerations of engine lubrication requirements, the new Hamilton Standard system comprises a separate and self-contained oil supply and accessory section unit for the airscrew.

The integral oil control assembly, as it is officially known, embodies a complete accessory unit and a tank for the airscrew oil. It is designed for mounting behind the airscrew hub and concentrates all fundamental operating functions in one compact section; that is to say, the hydraulic pumps, constant-speed governor, auxiliary motor for feathering and reversing, and the control valves, are all embodied in this single unit.

Quite aside from considerations of installation convenience, this new departure, by permitting an oil supply separate from that of the engine, allows the use of a fluid primarily suitable for the airscrew itself. Furthermore, by employing larger capacity pumps and operating on lighter oil than previously possible, the assembly is stated to allow the use of airscrews having larger and wider blades for higher power absorption and greater thrust. These last factors can be assessed as being of some importance in meeting the high take-off and climb requirements of modern military transport aircraft and, in addition, there is some military advantage in that enemy damage either to the engine or the airscrew will not necessarily affect adversely the pilot's control of the other.

The new assembly has passed U.S. Air Force and Navy type tests and performed satisfactorily during initial flight tests. Among aircraft on which it will be used are the Boeing C-97 Stratofreighter, Fairchild C-119 and R4Q Packets, Douglas C-124 Globemaster, Grumman SA-16, Chase C-123, and the Grumman JR25 Albatross.

Hamilton Standard have also announced that they are supplying Hydromatic airscrews for the U.S. Navy's Martin carrier-based AM-1 attack bomber. These airscrews are 14ft 6in diameter versions of the larger Hydromatics now in production for commercial and military transport types. The four hollow-steel square-tipped blades have stronger cores to cope with the higher vibratory forces encountered in the operation of carrier-based aircraft.



This annular casing surrounds the airscrew shaft and comprises the oil tank, control pumps and valve units.

CIVIL AVIATION NEWS

INITIAL DEVELOPMENT: New figures for the production Ambassador show that with an all-up weight of 52,800 lb, operating from a runway length of 1,480 yards, 11,520 lb could be carried for 500 statute miles cruising at 42 per cent METO power.

International Aeradio in Burma : Airline Agreement Between Pakistan and Ceylon : Bahamas Airways Taken Over by B.S.A.A.

SURVEY EXPEDITION TO INDIA

AIR SURVEY CO., LTD., a subsidiary of the Fairey Aviation Co., Ltd., has recently despatched an expedition to undertake Government surveys in India, Nepal and Pakistan. The expedition left White Waltham in a Dakota which, equipped with high-altitude engines, will be used for many of the photographic flights over mountainous country where photographs will be taken from 20,000 to 25,000 feet. Mapping experts accompanying the expedition will remain in India for some years to train the personnel of another subsidiary company of Fairey's, Air Survey Co. of India, Ltd., which is being re-equipped with the most modern cameras and mapping process apparatus. This company, previously known as Indian Air Survey and Transport, Ltd., operates from Dum Dum, Calcutta.

AIR CHARTER

ALTHOUGH the general tone of the air freight market continued rather quiet at the opening of the year, carriers are said to be busier than for the same period in 1947. At present there are enough freighter aircraft to meet the charterers' demands even though the larger part of the Halifax fleet is still on the Berlin airlift. Dakotas have been employed on several passenger charters, including the repatriation of the crew of an Egyptian ship from Liverpool to Alexandria. Such charters show a saving in expense to the ship owners since whilst being repatriated ships' crews are entitled to full wages, and sea transport, in spite of the lower fares, can be expensive for the ship owner. In this particular case the total cost of air transport plus wages in flight was slightly lower than the cost of sea transport plus wages on board.

NAVIGATION AIDS IN BURMA

LEADING British manufacturers of communication equipment, including E. K. Cole, Ltd., General Electric Company, Pye Ltd., Rediffusion Ltd., Arthur Lyon and Co. and E. J. Philpott, have undertaken to equip twelve air strips in bush districts of the interior in Burma with radio navigational aids before the monsoon breaks at the end of March. Failure to complete the contract which is understood to be worth £43,000 will jeopardize the safety of flying operations by the recently formed Burma Airways. The Government of Burma made International Aeradio Ltd. responsible for designing the overall layout of the equipment and for handling sub-contracting. At the end of February the equipment will be flown by International Aeradio from Bovingdon to their own station at Rangoon. From there the equipment will be carried and installed by that company.

I.C.A.O. COMMUNICATIONS CONFERENCE

THE growth of air traffic throughout the world has produced a serious scarcity of radio frequencies for communications between aircraft in flight and ground stations. At the third session of the International Civil Aviation Organization Communications Division, which opened in Montreal on January 11th, representatives of the 25 member nations are examining a draft allotment for the air routes. The draft plan was originally prepared at a Conference of the International Telecommunications Union, the agent for the United Nations responsible for allocation of all radio channels, and first steps in the allocation programme were taken at New Delhi last November when an I.C.A.O. Regional Meeting co-ordinated the frequency requirements for South East Asia. At Montreal, European frequencies are being discussed concurrently with the Divisional Meeting and another I.C.A.O. Regional Meeting will study and co-ordinate the frequency requirements for the Middle East and African-Indian Oceans next March. The Air Navigation Commission and the Council of I.C.A.O. will consider the results of these meetings before they are transmitted to the I.T.U. by the end of June this year. At present only 149 radio channels in the high frequency bands are available for the exclusive use of civil aviation throughout the world, and whereas during day-light hours several transmitting stations can operate on the same frequency without interference provided they are sufficiently far apart, at night those stations are likely to interfer seriously with each other owing to the greater range of radio signals. The Communications Division is also taking into account the experience gained throughout the past ten months in the application of I.C.A.O. Communications Procedures which came into effect in April last year. It is understood that standardization of the form and content of messages and the introduction of common practices and methods in handling messages has enabled present communication circuits to handle increased traffic, but even so the Division is now considering additions and amendments.

Civil Aviation News . . . . .

The Divisional Meeting is expected to last about six weeks and is being attended also by observers delegated by airline members of the International Air Transport Association.

B.E.A. BERLIN SERVICE

ONE Dakota, fully equipped with Rebecca, has been hired by British European Airways from B.O.A.C. for flying into Berlin. The aircraft will be based at Hamburg and will fly scheduled services twice a day, one of which will link up with the daily service from Northolt. As far as is known there is no plan for B.E.A. Vikings to be fitted with Rebecca, nor of any extension in the temporary Dakota fleet. It will be remembered that Rebecca is the airborne part of the equipment for homing on to Eureka beacons which are an essential part of the R.A.F. air traffic system for the Berlin air lift.

PAKISTAN-CEYLON AGREEMENT

A BILATERAL air agreement was signed in Karachi on January 3rd by Pakistan and Ceylon. The agreement, which contains 14 articles and one annexe, defines the conditions under which scheduled air services of each dominion will operate between the two countries. Ceylon will operate two routes: Colombo-Madras-Bombay-Karachi-Cairo and possibly beyond, and from Colombo through India to Chittagong. Pakistan will also operate two routes: Karachi-Bombay-Madras-Colombo-Rangoon and/or Singapore and possibly beyond, and from Chittagong to Colombo, via India.

Only recently the bilateral air transport agreement between Ceylon and India was ratified and signed in New Delhi. In that agreement the airline designated by Ceylon was accorded the right to operate from Colombo or Kankasenturai to Trichinopoly and also from Colombo to Trivandrum or Madras, Bombay and beyond. The Indian airline was entitled to operate from Bombay to Colombo and beyond if desired, from Madras to Colombo and beyond and from Tirucharapalli to Colombo or Kankasenturai; Trivandrum to Colombo or Kankasenturai.

RECOGNITION OF RIGHTS

THE I.C.A.O. Convention on International Recognition of Rights in Aircraft has now been signed by three more nations, Denmark, Norway and Sweden, bringing the total number of signatories to 23. The Convention is designed to ensure that legal title and properly recorded claims against an aircraft will follow it wherever it goes. The terms of the Convention ensure among other things that mortage placed upon an aircraft in any ratifying states will be generally enforceable in all other such states. This is expected to increase the readiness of investors to accept these highly mobile properties as security in financing arrangements.

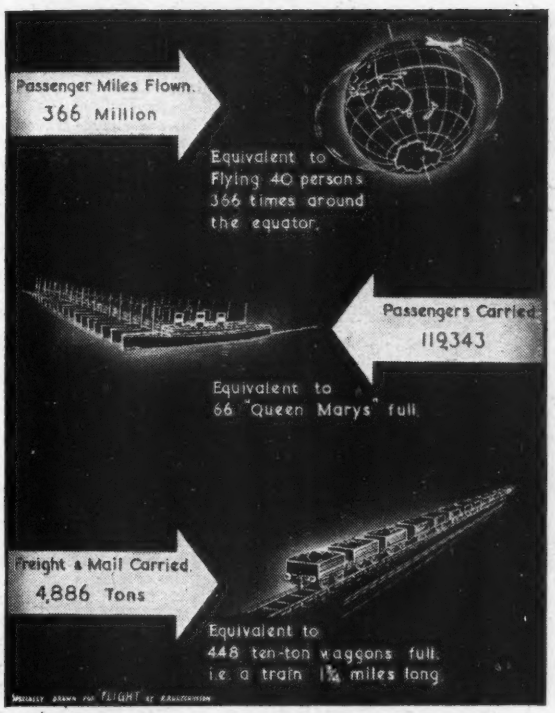
A.R.B. PUBLICATIONS AND NOTICES

AMENDMENTS and additions to British Civil Airworthiness Requirements have been issued by the Air Registration Board, and include Issue 14 of Contents; Issue 10 of a General Foreword; Amended Sub-sections A.12 and A.34; a new bound Section "C" on Engines and Propellers, and a bound Section "L," Issue No. 2 on Licensing. The Board has given further consideration to renewal dates for Amendments to the Requirements and it has been decided not to ask for any additional subscriptions until more progress has been made towards consolidation of the Requirements. Until further notice additions and amendments will be forwarded to subscribers without further payments. The following *Notices* to Licensed Aircraft Engineers and to Owners of Civil Aircraft were issued on January 1st: Notice No. 2, Issue 5, on the Supervision of Licensed Aircraft Engineers; No. 3, Issue 2, on the Duties

British Airways' Operating Statistics for September, 1948

WITH the exception of a very slight decrease in the number of aircraft miles flown in B.E.A. and a fall in freight ton-miles flown by B.S.A.A., the Corporations generally flew further and carried more during September, 1948, than in the same month last year. The total freight ton-miles flown in B.O.A.C. increased over the 12 months from 486,619 to 931,715, an increase of 91.5 per cent, which was largely responsible for increasing the total freight ton-miles by 60.1 per cent. The amount of mail carried by B.E.A. increased 185.4 per cent from 36,665 to 104,660. In the first half of the current year, from April until September, 1948, the freight ton-miles flown were 61 per cent higher and the mail ton-miles increased by 21 per cent over the same period last year. To carry that traffic the Corporations flew 10 per cent more aircraft miles. The total passenger miles flown in the first half of 1948-49 were 318,361,782, of which B.O.A.C. flew 193,116,699, B.E.A. flew 98,413,014, and B.S.A.A. flew 26,832,069. Figures for September, 1947, are shown in brackets.

	B.E.A. All Divisions	B.E.A. British Division	B.E.A. Continental Division	B.O.A.C. All Divisions	B.O.A.C. Western Division	B.O.A.C. Eastern Division	B.S.A.A.
Passengers carried	77,362 (69,525)	51,611 (51,233)	25,751 (18,292)	11,878 (9,867)	4,388 (3,028)	7,490 (6,839)	1,568 (1,103)
Cargo Carried : Mail (tons)	238.2 (99.4)	99.4 (58.1)	138.8 (41.3)	131.5 (125.4)	25.0 (23.2)	106.5 (102.2)	14.9 (13.7)
Freight (tons)	491.1 (270.6)	110.2 (95.4)	380.9 (175.2)	263.4 (145.0)	47.5 (18.9)	215.9 (126.1)	38.3 (38.3)
Average Load : Passengers (No.)	15.6 (11.6)	13.0 (8.1)	17.9 (18.7)	17.0 (13.0)	27.8 (26.4)	14.9 (11.0)	11.3 (10.2)
Total (lbs)	3,226 (2,305)	2,422 (1,466)	3,855 (3,804)	4,807 (3,830)	7,356 (6,418)	4,370 (3,446)	4,110 (4,022)
Average Capacity Available : Seats (No.)	21.1 (14.6)	18.4 (10.7)	23.6 (22.4)	23.7 (18.5)	42.0 (43.5)	20.2 (14.8)	19.8 (18.2)
Total (lbs)	4,832 (3,546)	3,959 (2,413)	5,514 (5,568)	7,533 (5,891)	11,744 (11,765)	6,811 (5,020)	7,066 (6,811)
Average Length of Haul : Passenger	252 (216)	150 (137)	454 (441)	3,046 (2,917)	2,323 (2,482)	3,430 (3,112)	3,124 (3,540)
Mail	439 (369)	167 (116)	635 (725)	4,530 (4,195)	3,464 (3,510)	4,780 (4,351)	5,671 (5,638)
Freight	413 (456)	183 (155)	479 (620)	3,537 (3,356)	2,993 (3,006)	3,687 (3,408)	5,506 (6,012)
Hours Flown : Revenue : passenger services ...	8,761 (10,147)	4,856 (7,636)	3,905 (2,511)	11,032 (11,401)	1,361 (1,230)	9,671 (10,171)	2,082 (1,808)
cargo services	550 (366)	— —	550 (366)	970 —	— —	970 —	— —
charter and special flights	74 (62)	74 (59)	— (3)	534 (1,031)	— —	534 (1,031)	27 —
Non-revenue, total	207 (214)	123 (140)	84 (74)	1,793 (1,787)	773 (661)	1,020 (1,126)	356 (181)
Equivalent annual utilisation (revenue hours flown) per aircraft	1,527 (1,411)	1,385 (1,499)	1,725 (1,206)	1,457 (1,492)	— —	— —	1,264 (1,362)
Unduplicated route miles in operation at end of period	15,372 (17,032)	4,371 (6,448)	11,001 (10,584)	67,088 (57,275)	8,523 (7,748)	58,565 (49,527)	24,375 (20,674)
Percentage regularity	96.7 (98.7)	96.2 (98.5)	98.2 (99.9)	99.7 (99.0)	99.0 (100.0)	99.8 (98.9)	100.0 (96.7)
Average length of stage flights (miles)	181 (133)	113 (101)	395 (361)	980 (868)	1,074 (1,193)	966 (834)	1,025 (1,268)



This diagrammatic representation of the traffic figures for B.O.A.C. during 1948 was submitted by a member of the staff of the Corporation. During the year B.O.A.C. flew 27,165,211 aircraft service miles. It is rather interesting that in the same period the "Queen Mary" made 40 crossings of the Atlantic

ANOTHER B.S.A.A. SUBSIDIARY

BAHAMAS AIRWAYS, LTD., has now become a subsidiary of B.S.A.A., and will continue to operate services between Nassau and the islands of the Bahamas with amphibians and flying-boats, and fly charters to Florida, Cuba, Jamaica and Haiti. The Chairman of the Board is the Hon. H. G. Christie, who held the controlling interest in the company, and B.S.A.A. is represented by its Chairman, Mr. J. W. Booth. The Hon. D. K. Solomon, C.B.E., K.C., President of the Legislative Council, and Mr. D. B. McKinney, a member of the Bahamas House of Assembly, are also on the Board. The Managing Director, W/C. D. R. Cameron, was formerly B.S.A.A.'s local manager at Nassau. At present the fleet consists of a Consolidated Commodore flying-boat, a Catalina amphibian, two Grumman Goose amphibians, and a Seabee amphibian. Together with another subsidiary company, British West Indies Airways, Ltd., with headquarters at Trinidad, Bahamas Airways, Ltd., will provide valuable feeder services to the B.S.A.A. main routes through the Caribbean, operating to countries along the Central American seaboard, North and South America.

AIRCRAFT ORDERING REVISED

AFTER much criticism of the system for ordering aircraft for British Airways, the Government sought the advice of Mr. Hanbury-Williams, Chairman of Courtauld's, Sir Roland Smith, Managing Director of Ford's, and Mr. George Wansbrough, Chairman of Reyrolle, last February. Following their recommendations, the Government has now decided to change the existing procedure, in which the Ministry of Supply acted as agents for the Ministry of Civil Aviation or the Airways Corporations in placing production contracts for civil aircraft. In future the Corporations will be able to place contracts with aircraft manufacturers for production aircraft. Development work will, however, remain in the general control of the Ministry of Supply since aircraft development is largely financed from public funds. Machinery has been set up for agreeing the stage in the development of an aircraft type at which the Corporation may place the production contract. The Government believe that the new arrangements will provide a satisfactory and workable procedure in which the interests of all concerned, including the commercial requirements of the Airways Corporations, will be fully safeguarded.

of Aircraft Engineers Licensed in Categories "A" and "C"; Notice No. 6, Issue 9, containing general information of British Civil Airworthiness Requirements; Notice No. 7, with particulars of Sections and Sub-sections issued on British Civil Airworthiness Requirements; and Notice No. 10, Issue 3, with Ratings of Categories of Aircraft Maintenance Engineers' Licences.

B.E.A. TRAFFIC IN NOVEMBER 1948

Category	U.K. Services Nov 1947	U.K. Services Nov 1948	Continental Services Nov 1947	Continental Services Nov 1948	Total B.E.A. Nov 1947	Total B.E.A. Nov 1948
Passenger flights completed ...	3,048	2,549	896	933	3,944	3,482
Distance flown—miles ...	358,167	242,085	408,188	394,355	767,355	636,440
Passengers carried	16,207	13,934	9,660	7,688	25,867	21,622
Excess Baggage carried—lb....	32,051	23,065	81,086	47,756	113,137	70,821
Mail carried—lb.	159,253	192,404	111,962	200,865	271,215	393,269
Freight carried—lb.	90,511	140,593	357,197	565,497	447,708	706,090
Route Distance—miles ...	4,255	2,801	9,035	10,980	13,290	13,781

BREVITIES

The Italian company, Societa Italiana Servizi Aerei, with headquarters at Trieste, has opened an air service to Vienna and Prague

* * *

Air Lines of Australia, Ltd., a subsidiary company of Australian National Airways, Ltd., showed a profit of £6,927 for the year 1947-48 and declared a dividend of 7½ per cent.

* * *

Lord Pakenham, Minister of Civil Aviation, is expected to visit Manchester on February 7th to open new passenger terminal buildings at Ringway Airport.

* * *

On January 5th K.L.M.'s 500th regular return flight on the North Atlantic route was completed. Since the service opened on May 22nd, 1946, 29,683 passengers, over 640 tons of freight and 122 tons of mail were carried and more than 3,784,019 miles were flown in 17,273 flying hours. The K.L.M. Caribbean network was increased to 8,000 route miles on January 3rd with the twice-weekly extension of the Curacao-Aruba-Barranquilla-San Jose service to Panama City.

* * *

Forecasts by the Department of Civil Aviation indicate that Australian internal services will have carried 1,375,000 passengers during 1948. Some indication of the growth in freight traffic is given by the figures for the first quarter of 1947 when 2,845 tons were carried and the September quarter of 1948 when the amount had risen to 8,175. In spite of an increase in route mileage from 48,811 in 1947 to 49,059 in 1948 the hours flown in the last quarter were 57,942, slightly less than the figure of 58,776 hours in 1947.

* * *

S.A.S. are arranging a fortnightly direct service between Copenhagen and Nairobi, East Africa. The aircraft will fly via Zurich, Athens, Cairo, Khartoum, Asmara and Addis Ababa, and direct communications with Stockholm and Oslo will be operated from Copenhagen.

* * *

Across the Atlantic during 1948 Pan American Airways carried 33,300 passengers west-bound and 22,700 east-bound on more than 2,000 flights, an average of nearly six trips a day. 31,000 passengers were carried from New York to Bermuda and another 82,600 from New York to Latin American countries.

* * *

Plans for a service between Birmingham and Paris were discussed at a recent meeting between Lord Pakenham, Minister of Civil Aviation, and representatives of 16 local authorities in the Midlands who have been pressing for the use of Elmdon Airport, Birmingham, for scheduled air services. A daily service would be operated jointly by B.E.A. and Air France, with B.E.A. aircraft based at Manchester leaving Birmingham on Mondays, Wednesdays and Fridays, returning on Tuesdays, Thursdays and Saturdays, and Air France operating on alternate weekdays. The service would be in addition to the exist-

Civil Aviation News . . . . .

ing services between Manchester and Paris which will shortly be increased to two a day, one flight by B.E.A. and the other by Air France.

* * *

The Australian Department of Civil Aviation has allocated £436,000 for building 95 radar beacons throughout the Dominion. Experimental equipment has been operating for several months between Sydney and Melbourne, and the system will now be extended to cover all major routes in Australia.

* * *

Accompanying Bristol's Chief Test Pilot, Mr. A. J. Pegg, as pilot of the Brabazon on its first flight will be G/C. H. A. Purvis, D.F.C., A.F.C., head of the Civil Test Section of the A. & A.E.E., Boscombe Down. The other members of the crew will be six Bristol aircraft test engineers, responsible for the aircraft instrumentation, electric and hydraulic services under Mr. J. Radcliffe, and three engineers responsible for operation of the engines under the supervision of Mr. L. D. Atkinson.

* * *

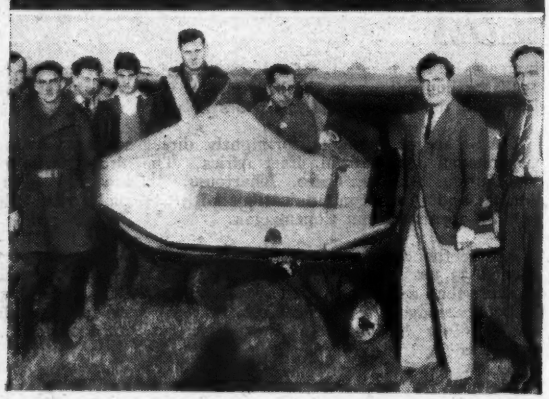
After March 2nd the Air-India International twice-weekly service London-Cairo-Bombay will again fly via Geneva. As a result of the introduction of permits for passengers travelling between India and Pakistan the traffic on the Bombay-Karachi route has dropped and the service has been reduced to two return flights between Bombay and Karachi each day. One flight is operated non-stop by a Viking and the other by a DC.3 via Ahmedabad.

* * *

It is understood that American Overseas Airlines, North-West Airlines and Pan American Airways have asked the New York Supreme Court to compel the Port of New York Authority to honour leases granting them landing rights at Idlewild Airport. The Authority has claimed that the leases are unworkable owing to increased costs, but for the airlines the situation has become urgent since the delivery of Stratocruisers is imminent.

FROM THE CLUBS

COWES Aero Club reports that in 1948 most encouraging progress has been made with a steady increase in membership and enthusiasm. The depression which has been said to affect private flying in many parts of the country has not been apparent at the Cowes Club. Holiday makers and residents have kept the aircraft in the air throughout the year and the types of aircraft which have visited the Club range from the Dakota and Dove to the Aeronca and, it is said, embrace almost every type of light aircraft now in use in Europe. Of the people who flew at Cowes during 1948, 47 members of the Club renewed or obtained "A" licences and approximately 150 members undertook refresher or advanced instruction. Dual flights numbered 800 and solo flights about 700. In recent months the hire of the Auster Arrow at £2 an hour solo has proved exceptionally popular. The high light of the year was the air rally on August 22nd attended by about 5,000 people and no fewer than 60 visiting aircraft from all over the country.



ULTRA-LIGHT AT ELSTREE: (Top) A member of the Elstree branch of the Ultra Light Aircraft Association, Mr. R. Parker, has constructed this Heath Parasol, powered by a Blackburne Tomtit engine, being flown by a member, Mr. R. Debenham. The lower picture shows Mr. G. A. Chamberlain in the cockpit of the branch's B.A.C. Drone. He plans to take the members up to solo standard using this machine as a glider. Later an engine will be installed for powered flight instruction.

Throughout the winter dancing, darts matches and table tennis have been popular social activities and the programme for 1949 which started with the annual dance on January 8th includes special attractions which are being considered, including monthly air rallies. If permits can be obtained extensions to the club room will be made during the coming year. Private charter passengers and freight flights from Cowes airport maintained a high level of activity particularly on the Southampton and Portsmouth runs during the summer holiday season.

* * *

IN a lecture to the Luton Branch of the Royal Aeronautical Society on Wednesday, January 5th, Mr. Peter Masefield referred to the economic situation of private flying in this country. There were, he said, fifty clubs in the country, mostly in serious financial straits, and the total number of private planes on the register was 708. Before the war there were 62 clubs operating 400 aircraft. He referred also to the pre-war civil air guard scheme in which, at a cost to the public of 2s 6d per hour, 10,000 pilots were to be trained, and also to the Whitney Straight Committee's post-war scheme for training the same number of pilots at a cost of £1 per hour. One point in his case for private flying was that a healthy light aircraft movement provided a good basis for an export market. Between the wars 80 per cent of orders for British aircraft were for machines weighing less than 5,000 lb. De Havillands alone manufactured 4,000, the majority of which were for export. The light aircraft movement was a great asset to the aircraft industry in times of peace, de Havillands, A. V. Roe, Percivals, Saunders-Roe, Westlands and Miles all gained experience in light aircraft design and construction.

* * *

AS a result of the policy to extend activity and to develop a broader outlook in the A.B.A.C., the name of the Association has been changed to include the Air Centres. Mr. G. H. M. Miles suggested this at the United Aero Clubs' Ball held in April last year, and the A.B.A.C. is now officially known as the Association of British Aero Clubs and Centres. The principle underlying the Air Centre scheme is that the flying and technical side of the organization is divorced from the social side, and where a centre is organized at an airfield an almost unlimited number of clubs and aeronautical bodies may use the facilities offered.

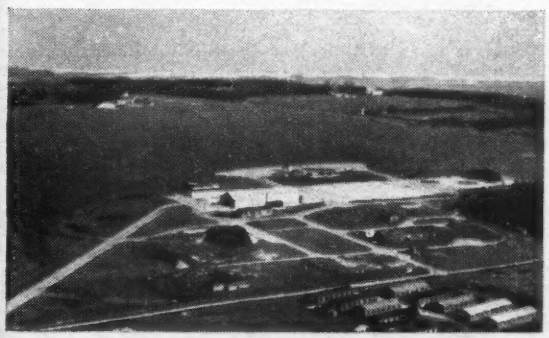
The A.B.A.C. sets the standard for technical and training matters with which its member clubs and centres are required to comply, thereby promoting safe and economical aircraft operation. In so far as social and similar facilities are concerned the Association desires to leave the local organization to develop in the manner which best suits local needs and to create such working arrangements with the branches of all other bodies as best suits their individual requirements. The date and manner of the introduction of the scheme will be for decision by the individual flying clubs and will depend upon local circumstances. The members of the Council are: Mr. Whitney W. Straight, O.B.E., M.C., D.F.C., Chairman; Mr. G. H. M. Miles, Vice-chairman; Mr. Bernard F. Collins; Lt. Cdr. F. E. Darlow; Capt. H. Duncan Davis, A.F.C.; W/C. B. A. Davy; S/L. J. E. Doran-Webb; Mr. R. A. Gifford, A.F.C.; W/C. W. L. Gordon; Mr. A. G. G. Marshall, O.B.E.; W/C. G. P. F. O'Farrell; Mr. J. G. Rylands; G/C. F. H. D. Fearl, O.B.E.; Mr. L. C. Wheeler.

Servicing—A Vital Cog in the Civil Aviation Machine : Field Aircraft Services

In this clear aerial photograph of Croydon northside buildings, Field's premises are seen on the right.

BACKGROUND TO OPERATION

SUCH is the size and complication of the larger aircraft used to-day for the transportation of passengers and freight that the problem of keeping one of them serviced and inspected without drastically reducing its utilization is formidable enough to be causing real concern. However, the facilities of the major airlines, and their co-operation with the manufacturers of the new aircraft during the introductory stage and preliminary period of operation, has to date provided a solution. On a slightly lower plane are the many smaller British and foreign companies which chiefly operate well-known and well-tried aircraft. In their case the actual procedure of maintenance presents no great problem and in most cases overhauls, particularly complete overhauls for C. of A., are farmed out to companies



Light aircraft are serviced at the company's international base at Lympne.

specializing in the work. It is here, however, that efficient and economical work becomes specially important. Long periods spent on the ground by one aircraft of a small fleet, unduly high cost of overhaul, or mediocre work, may in these days represent the difference between success and failure on the part of the operators.

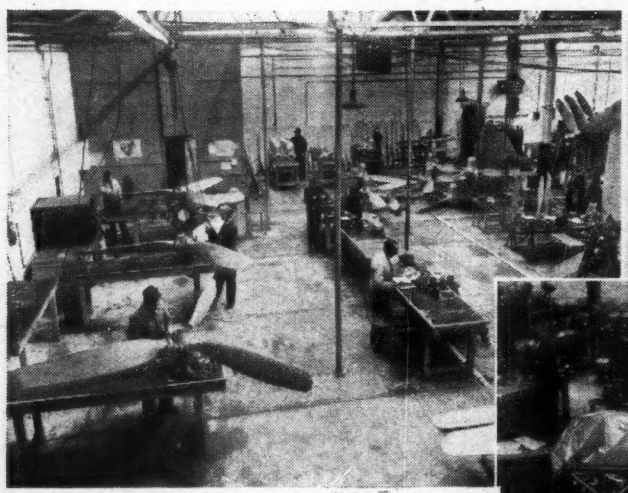
Though many operating companies and countries would like to set up their own servicing organizations, this is a thing that cannot be done in weeks, or even months, with success unless an experienced and skilled nucleus exists. Men to form such a nucleus are at a premium. For this reason a large number of British and foreign operators take their overhaul work to established organizations backed by this hard-to-come-by experience. Such a company is Field Aircraft Services, Ltd. "Fields" specialize in complete aircraft overhauls and, while having the facilities to handle almost any light or medium transport as well as certain of the four-engined types, a large proportion of the work is concerned with rapid and efficient overhaul of Dakotas.

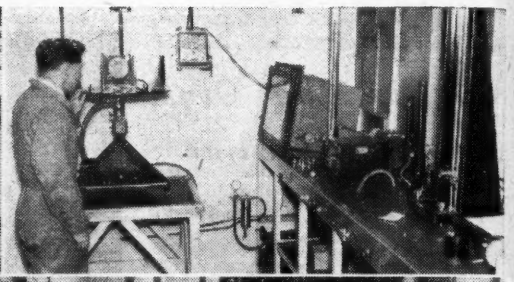
The company operates from four bases. Bovingdon airport, Herts, is the international service base for heavy aircraft. Here inspections, maintenance and service, including power-plant changes, can be handled. At Tollerton airport, Notts, major overhauls for renewal of C. of A. of aircraft up to Dakota size represent the main work. Lympne airport, near Hythe, Kent, is the international service base for light aircraft, including small twins such as the Gemini. The fourth centre of activities, and headquarters of the organization, which, is, of course, a part of the Hunting Group, is at Croydon airport.

Director and General Manager at Croydon is Mr. J. L. Smith, and the assistant General Manager, Mr. R. W. Fox. Work here is particularly confined to engines, airscrews and accessories, including instruments and radio, but a certain amount of airframe servicing is also carried out. Power plants removed at Bovingdon and Tollerton are transported by road to Croydon for complete strip, inspection and reassembly.

There is a degree of elasticity in connection with the work undertaken by the four sections, as, for instance, at Croydon, where Dakotas or smaller aircraft may be flown in for an engine change, and where minor repairs and modifications to airframes can be looked after. The same

Twenty-four hour ser ice for regular operators is offered at Bovingdon, depicted above.





Flight" photographs.

(Above) Fields' airscrew section, a relatively new department, is developing very satisfactorily. (Top right) Engine and flight instruments are serviced and checked here. (Right) Re-assembly of Pratt and Whitney engines for Dakotas following major overhaul. All three of these departments are at Croydon.

Background to Operation . . . . .

is true of Bovingdon, which also offers a 24-hour service for minor repairs in addition to its main tasks. Special conversions of aircraft for passenger, freight, survey or ambulance duties are accepted at Tollerton.

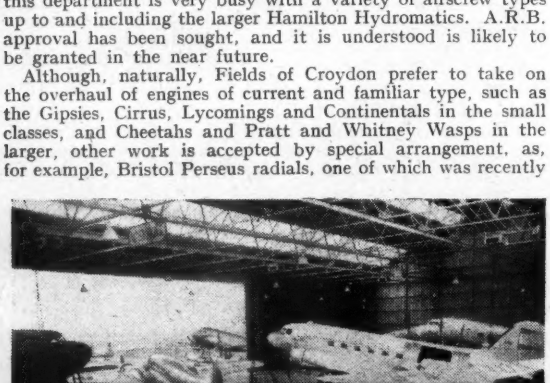
The weekly capacity of the engine division at Croydon is approximately nine large engines of the Pratt and Whitney 1830 class, and five light engines. Engine changes from the two-speed Pratt and Whitney 90Cs to the single-speed 92s, which are now being used, represents an important part of the work. Only those companies operating Dakotas over high mountain ranges such as those encountered on the Hump route are now retaining the 90C power unit.

A comparatively new section is that dealing with airscrew maintenance. After only two years in which to build up, this department is very busy with a variety of airscrew types up to and including the larger Hamilton Hydromatics. A.R.B. approval has been sought, and it is understood is likely to be granted in the near future.

Although, naturally, Fields of Croydon prefer to take on the overhaul of engines of current and familiar type, such as the Gipsies, Cirrus, Lycomings and Continentals in the small classes, and Cheetahs and Pratt and Whitney Wasps in the larger, other work is accepted by special arrangement, as, for example, Bristol Perseus radials, one of which was recently turned out with the help of the Bristol Aeroplane Co. This unit will be used as a standard for some others to follow. On completion, small engines are tested on a bed at Croydon airport, and large units in a Ministry of Supply test house at nearby Carshalton. No liquid-cooled engines are serviced.

Engine and airframe overhaul has much in common economically with original production of major aircraft components. If a department could be planned and tooled for the servicing of a single engine type, for instance, it could operate more efficiently than if a variety of units were to be handled. Again, there is a limit to the quantity of spares that any one concern can hold in its stores. Fields believe that Dakotas with their Wasp engines are likely to remain the bread-and-butter type for a few years to come, with other aircraft using one of the Gipsy range or Cheetah power units adding to the volume of work. The company is, nevertheless, looking ahead, and the general tendency is towards expansion of all sections to handle newer aircraft. Doves, Vikings, Haltons, Wayfarers and a few Skymasters are already being, or are about to be, handled.

To complete this brief survey of the activities of Fields Aircraft Services, the sale of civil aircraft must be mentioned. Mr. J. Lester Pendleton joined the company quite recently to manage that department. Due to the association with Percival Aircraft, another member of the Hunting group of companies, the agency for all marks of Proctor, new or converted, is particularly to be stressed in this connection. Sales also extend to the supply, frequently from stock, of several types of new and reconditioned power units.



Tollerton, Nottingham, where Fields undertake C. of A. overhauls of medium and large civil aircraft.

TRICYCLE TRAINER

IN some respects comparable with our Boulton-Paul Balliol and Avro Athena military trainers, though of appreciably lower power, the North American T-28, standardized by the U.S.A.F., is described as a "primary-basic" trainer. A quantity of 268 has been ordered "off the drawing board" and will soon go into production at Downey, California.

The engine of the T-28 is a Wright R-1300 radial, with a take-off rating of 800 h.p.; top speed is 292 m.p.h. and the service ceiling 31,650ft—a vast improvement on the AT-6 Texan which had a speed of only 205 m.p.h. and a service ceiling of 22,000ft. At its normal gross weight of 5,862 lb, the T-28 will be about 600 lb heavier than the AT-6. The type is further notable in being the first American military trainer of its type to have a tricycle undercarriage. The nosewheel is steerable by either pilot, and carries a movable taxying light. An added safety feature is the 12½ deg angle of view over the nose—1½ deg more than the specified minimum.

CONSCRIPTION AND THE R.A.F.

A National Serviceman Relates His Experience and Offers Some Suggestions

RECENT articles in *Flight* have focused national attention on the numerous problems which to-day beset the Royal Air Force, and several solutions have been proposed. The subject is one of such vital importance in the pattern of defence that all opinions, if backed by personal experience and knowledge, should merit consideration.

My own views, which are those of a conscript member of the R.A.F. for a mere two years, may appear on the surface to be of small importance; nevertheless, they are relevant and will not, I trust, be dismissed too lightly. Anyone who has questioned a National Serviceman on the subject of his enforced occupation will have encountered, almost invariably, vehement expressions of dissatisfaction; constructive criticism comes more rarely, and I intend to weigh up as far as possible the pros and cons for conscription, with particular reference to the R.A.F., from a "victim's" viewpoint.

IN publishing a series of articles on the problems of the present-day R.A.F. we have aimed at giving the views of all levels of the Service. We began with two articles by Air Chief Marshal Sir Philip Joubert (December 9th and 23rd, 1948). These were followed by a contribution from Air Commodore Howard-Williams (January 6th, 1949). Last week an Airman, Mr. F. A. S. Brown, gave his opinions, and the present article, written by a conscript, may be said to be a worm's-eye view. This particular "worm" did not turn, but doubtless he often felt very much like doing so.

The cross-section of opinions disclosed should be of some service to the Air Ministry in pinpointing targets for to-day, spots where energetic action appears to be needed.

My two years' service began 12 months after the war ended—in August, 1946. Keen and eager, I arrived at a well-known dispersal centre in Lancashire, with many companions in varying degrees of keeness and eagerness. Eight days elapsed before we had obtained a uniform and identity card; eight days, almost, before there was any official sign that our arrival had been noted. We left for a recruit centre with a feeling of distrust of Air Force organizing ability. At the "square-bashing school" about 1,000 hours of spare-time A.T.C. attendance were laughed off with a brusque "forget all you ever learnt." The N.C.O.s were mostly "sweating on demob," and were as contemptuous of us as we were awed by them. They succeeded, however, in moulding our marching into a spectacle not too unpleasant to behold, and insisted that we be initiated most thoroughly in all branches of "bull."

We were dispersed to various stations for trade training, and a number of us went to Wales for instruction as flight mechanics (engine). After six months, the necessary proficiency had been obtained, and posting to the Middle East was announced. Fifteen minutes after receiving two inoculations, I learned that a conversion course to the more skilled trade of fitter II (engine) had necessitated cancellation of my overseas posting, as I had just acquired the 55 per cent rating which automatically preceded such a course.

Despite protests that my mechanical aptitude was obviously slight, and the fact that flight mechanics on regular engagements (who would be denied all prospects of promotion until they had attained the status of fitter) were being sent abroad, I was relentlessly despatched to a training school in Bedfordshire for a further six months' study of engines. Another posting to the Middle East followed. This time I received three inoculations and got as far as the transit camp, even acquiring two khaki-drill suits. After waiting for seven weeks, I had to return the tropical clothing. It had been decided that sending abroad airmen with a few months' service left was useless, and "home postings" were hurriedly organized.

The airfield on which I spent my remaining seven months in the Service was the home of three squadrons of Meteors, and playing a part in the maintenance of modern fighters seemed to be an alluring prospect—a recruiting poster turned to reality. It was puzzling at first, and eventually frustrating, to find that the much-publicized shortage of skilled tradesmen had not affected this particular unit to any noticeable degree. In the case of engine trades, certainly, it was virtually impossible for the veritable swarm of N.C.O.s to find sufficient work to occupy more than about two-thirds of a man's day, even allowing for a liberal ration of that popular standby, hangar-sweeping. For a number of reasons, which I will later attempt to analyze, there was among the men a painful lack of enthusiasm, and no feeling that a useful job of work was being done.

When I was released from the Service in August last year, my elation was not tempered by a single regret. In passing, I must add that the demobilization machinery was of outstanding efficiency; if conscription might be compared with the four-stroke cycle, the exhaust valve appeared to be the only component not in need of a thorough overhaul.

Such were the prosaic circumstances in which I formed my impressions of the post-war Air Force. To many my words will appear the precocious chirpings of an insignificant "erk," but I feel that, although my rank and achievements could have been no smaller, I was in a splendid position for observation.

If a military force is to operate efficiently it must possess discipline. No rational person would ever deny this. Interpretations of the word are so varied, however, that the measures adopted to instil discipline produce results as unlike as chalk and cheese, and will be unsatisfactory in any form other than self-discipline, which can only exist in a contented service. Discontent and depression have done more to mar the efficiency of the Air Force to-day than any of the shortages of men or equipment featured in official excuses. There have been many reasons for the disturbing drop in morale, and to define them in tangible form is far from simple.

The first step in establishing a better spirit, among ground personnel at least, is to ensure that every man has a full share of work in his own particular occupation, and an allotment of responsibility proportionate to his rank, knowledge and intelligence. Automatic promotion through seniority is manifestly a foolish system and should be abolished.

I could see no obvious reason why, as an engine fitter, I should have been in a position to sign away a pilot's life on a Form 700, but was at the same time prohibited from running the engines, as my sleeve was devoid of stripes. This despite the fact that my recent training gave me a more thorough knowledge of the workings of a gas turbine than that possessed by the majority of the N.C.O.s, or, for that matter, the pilots.

Additional duties imposed upon the servicing tradesmen often carry them to the fire section, cookhouse, or other parts of the camp entirely disconnected from the technical side, but the spectacle of a horde of cooks or clerks industriously sweeping a hangar has yet to be seen.

I have no desire to urge the introduction of trade unions into the R.A.F., but illogical distribution of fatigues should be avoided, as men are obviously best employed in the job for which they have been trained. An airman who has spent half the night tramping round the camp roads on "fire piquet" generally shows little enthusiasm for clean-

Conscription and the R.A.F. . . . . .

ing drip-trays, a drab task at any time, the next morning.

Despite my own experience, it appears that the Air Force is, in fact, suffering from a shortage of servicing tradesmen. I feel that a partial solution is a modified system of employment of fitters, riggers and "ancillary trades." It seems that the present system is to have a number of men working actually on the squadrons, who, after completing daily inspections, refuelling, and aircraft handling, spend a good deal of time sitting in their crew-room. The remaining tradesmen are employed in the repair and inspection hangar; they likewise suffer periods of idleness. Either by uniting the two sections, or by placing a mobile squad between them, a great deal of time-wasting could surely be cut out

There is little doubt that for some years to come the numerical strength of the R.A.F. will consist largely of National Servicemen. It is unavoidable that an uneconomic proportion of a conscript's service time will be occupied by training, but in my opinion the suggestion, now publicized with almost hypnotic frequency, that little or no use can be made of a man who spends only eighteen months in any of the Services, is unfounded rubbish. Two months, at the outside, of recruit training, followed immediately by a concentrated and carefully planned technical course of approximately twenty weeks' duration, will provide the squadrons with a ground tradesman capable of executing all servicing operations, up to and including minor inspections, for a further twelve months.

Tradesmen so produced would, however, have to be backed by a sufficient number of fully skilled regular tradesmen. Obtaining men of the right quality will demand improved conditions for the regular airman. The two training courses I underwent were poorly planned—the second was largely a repetition of the first; very little attempt was made to render the programmes at all interesting, and there were far too many irrevelant items included in the syllabus.

There is much evidence to support my contention that the wrong approach has been made towards establishing discipline. A notable example is the large number of R.A.F. police seen in the streets waiting to pounce on the erring "erk," who would probably never have tucked his cap in his belt had he been provided with a smart-looking uniform; and, more important, if he had learned from experience to respect the Service he represented. The young men with the "S.P." armbands, who enjoy a unique measure of unpopularity throughout the R.A.F. ranks, never, to my knowledge, display a great deal of proficiency in their true calling—the prevention and detection of crime.

A mechanic who refuels an aircraft with a cigarette in his mouth, and a cook who serves food with dirty fingernails, are both guilty of a flagrant breach of regulations, but any airman will agree which of those two actions is the more common, in fact almost customary. A little more firmness in Air Force cookhouses might have improved the quality of the food I sampled, which was usually poor.

Briefly, then, I suggest that the remedies lie in firm, but above all sensible, use of authority, whether by Air Marshals or Flight Sergeants; plenty of work for every member of the Service; and the abolition of worn-out conventions and inefficient organization. I saw many fine features of the Air Force—such as the aircrews whose deeds have made tradition, and the ex-apprentices from Halton who live for the Service. If my views, from a conscript's point of view, should help a little towards indicating shortcomings and possible ways of overcoming them, I shall feel that my two years' R.A.F. service has not been a complete waste of time.

R. J. B.

CORRESPONDENCE

The Editor does not hold himself responsible for the views expressed by correspondents. The names and addresses of the writers, not necessarily for publication, must in all cases accompany letters.

"RECOIL PROPULSION"

More Descriptive than "Reaction"

WOULD it be possible for the layman to have a clear explanation of the principle of jet propulsion? The explanations so far given to the general public have one major defect—they do not explain.

In these explanations we are reminded that action and reaction are equal and opposite. This is illustrated (in, e.g., "Gas Turbines and Jet Propulsion," published at your office) by the example of a man wheeling a barrow. When he encounters muddy ground he is conscious of the reaction of the barrow because his feet slip on the mud and he can make no progress. This example glances at—but ignores—the most significant aspect of reaction. I mean the reaction to the machine of the medium in which it travels.

The screw-propelled aircraft, the steamboat and the motor car depend on this reaction for their motion. They push back at the medium—air, water or earth—and the reaction of the medium pushes them forward. We are told, specifically, that the jet does not proceed by pushing at the air. Therefore it does not move forward by the reaction of the medium—it is always—"slipping in the mud." So the explanation as given shows only that jet propulsion couldn't work.

Could I venture on a rough illustration of how a jet may possibly function?

Suppose a tube, open at one end and closed at the other, were suspended in space. Suppose a bomb, loaded with small shot, were exploded inside the tube. The shot would fly in all directions. Some would strike the walls of the tube, some escape through the open end; but some would hit the closed end of the tube and propel it forward. Could not the mass of rapidly expanding gas be regarded as the bomb—continually exploding and continually battering the forward end of the jet casing with countless millions of small shot—the molecules of the gas? If this is an approximately correct picture, should not the jet and the rocket be called, not "reaction" but "recoil" devices? This may not be the best word to use; but it is preferable to one that is manifestly wrong in its implications.

L. HOLLIS.

Birmingham, 24.

MANNING THE R.A.F.

Officer-Man Relationship an Anachronism

MR. B. C. PHILLIP'S letter in your issue of December 30th was a pretty good example of the impact of the Service on the average citizen of to-day.

The comparative failure of the R.A.F. recuiting campaign is not really surprising except to those who still react to the artificial glamour of Service life, and who regard a good serving officer or man as a kind of purified civilian. In the eyes of these impregnated fanatics, to wish to remain a civilian when a Service career is open to you, is a plain demonstration of wilful obstinacy. "By Jove, I'd like to have that man under my command for 24 hours, Sir! Just 24 hours!" To these enthusiasts, Service life and discipline are things necessarily beyond reproach, things of which to be unquestioningly proud.

But to the ordinary modern man all the technical attractions of the R.A.F., and the many advantages to be secured from the Service, are immeasurably outweighed by the intolerable indignities of antiquated tradition and usage and the senseless insistence on the outward forms of discipline and obedience.

The R.A.F. organization, law, customs and social traditions are founded on those of the Army. These Army characteristics themselves have their origin in the remote past, when the social organization of a fighting unit reflected the social organization prevailing among civilians. The Lord of the Manor went to war with his own followers and these over the centuries evolved into the officer and his men.

A social revolution has taken place in this country over the last 50 years; it has taken place everywhere except in the

Correspondence . . . . .

fighting services, where a commissioned officer is still held to be a higher order of being, although his civilian counterpart has actually disappeared.

The officer-man relationship in the Service to-day is an anachronism. The system in use for the management of men was founded on the supposition that the majority of the men were illiterate vagabonds, or at the best, bone-headed simpletons. This system worked pretty well at Waterloo. Mulvaney, Otheris, and Learoyd thrived under it; it creaked a bit in 1914; in 1948 it was misfiring so badly that unless an entirely new system is specifically designed, the old one will become so unacceptable to the contemporary citizen that the scandal of mutiny can easily result. It has happened in the past when the rub has become too great to be borne.

The lack of discipline which is complained about to-day is almost certainly due to lack of respect for officers, i.e., as leaders. An intelligent, educated man may be required to treat an ignorant fool with elaborate theatrical respect because the former is an erk and the latter an officer; or even if the erk is an ignorant fool too, it is still a bad system which deifies an inefficient, unworthy officer. A veneer of officer-training should not automatically and almost irrevocably make an officer; especially if the whole weight and authority of the Service, Parliament and the King are pledged to uphold him.

A system of delegated autocracy enforced by graded forms of physical punishment cannot succeed automatically to-day. It worked in the past because of the social gap between officer and man. That gap has almost disappeared; for better or worse our social system has changed. The Services have got to find some way of ensuring the blind obedience, which is their life blood, on a basis of democratic equality—not aristocratic inequality.

To make such a change might not be such an immense task as, at first sight, it appears to be. It requires only that organizers shall themselves recognize the necessity for change.

By the way of constructive effort, I toss the following suggestions into the arena—and step hastily backwards!

(1) Why have Commissions? There is no need for the King to differentiate between his citizens. Run the ranks straight up without a break from bottom to top and abolish the slur of "other ranks."

(2) Make the uniform uniform, with only the badges varying.

(3) Eliminate the wide differences of living conditions between ranks; they are dangerous anachronisms to-day.

(4) Cut any form of parade to an absolute minimum; men were originally drilled in bodies for ease of moving them about. To-day we have mechanical transport.

(5) Let promotion and demotion be swift and easy, and on a basis of ability. Give generous powers in this matter to local C.O.s, so that they can use the men they know to the best advantage.

(6) Let the various ranks carry privileges, but as rewards and incentives—not as social distinctions.

Dunmow, Essex. J. S. POLE.

ABANDONED AIRFIELDS

Could be Used by R.A.F.V.R. and A.T.C.

YOUR reader's recent suggestion (*Flight*, 23.12.48) that abandoned airfields be used by R.A.F.V.R. units might be considered on the following lines:—

1. Choosing airfields close to public transport services.

2. Setting up a small cadre of regulars to look after minimum caretaking needs and to provide essential transport if necessary.

3. Asking A.T.C. units to use the airfields as a training H.Q. and help in providing manpower.

4. Catering for flying training at evenings or week-ends by visiting service aircraft from Reserve Units or from Regular Units whenever they can be spared.

5. Providing ground training staff from local resources and by occasional visits of regular instructors.

6. Limiting airfield control to volunteer A.C.P.s operating from caravans when flying training is in progress and using the airfield as an emergency landing ground at other times.

7. Providing servicing and maintenance facilities at evenings and week-ends by ex-members of the appropriate trades.

Is this impossible? I doubt it.

R.A.F.V.R. training could easily be expanded, too, by allowing flying personnel to take occasional trips as passengers in service aircraft to brush up their knowledge of modern procedure, in the same way these advantages are offered A.T.C. cadets whether or not they are likely to derive any benefit from it which will be of use to the service.

If abandoned airfields are in use, local personnel could sometimes be picked up for the purpose, thus again bringing the mountain to Mahomed. Where there's a will, etc.

Kew Gardens. "EX-R.A.F. TYPE."

FLYING FOR EX-NAVAL AIRMEN

Why Not Attachment to R.A.F.V.R. ?

I READ with interest Simon Warrender's letter in your issue of December 16th, 1948, and noted his widespread efforts in the National Press to draw attention to the lack of flying facilities for ex-Naval airmen. I have waited in vain for someone to reply to his letters, but there seems a marked reluctance in official quarters to make any statement apart from the usual "Lack of a Treasury Grant."

I should like to make the following suggestion: The Royal Air Force Volunteer Reserve offers flying facilities to ex-pilots of the Royal Navy and the Royal Air Force. As an ex-Naval pilot keen to continue flying at week-ends I joined the R.A.F.V.R. With all due respect to the Royal Air Force I very much regretted having to sever my connections with the Royal Naval Volunteer Reserve, and I am sure my feelings are shared by all those naval pilots who have also joined the R.A.F.V.R. During the war the R.A.F. trained naval pilots at E.F.T.S., S.F.T.S., and A.F.U. stages without the naval airman having to change his service. Why not retain this scheme in connection with the Reserves? Couldn't the ex-naval pilot retain his naval status and become attached to his local R.A.F.V.R. centre, forming, at those centres where numbers warranted it, a Naval Air Section "Lodger Unit" as was frequently done during the war? Surely the question of expense would not arise, except perhaps in the employment of a "Liaison Officer" who could ensure that the Naval Reserve Commitments could be carried out without interfering with the Royal Air Force programme. N. H. PROWTING.

Formerly Lieut. (A) R.N.V.R.
Now 204695 F/O. R.A.F.V.R.

Wimbledon, London, S.W.19.

CLIPPED WINGS

Potential Gangsters ? Allies ?

BEFORE G. Sandys-Lumsdaine (6/1/49) decided to criticise my previous letter to *Flight* (23/12/48), the least he might have done was to have read it. He credits me with writing or inferring a number of things which were not contained in the letter at all. I do not intend, therefore, to comment on them, but two points I would like to answer: first, I do agree to a limited extent that our Fighting Services appear to be suffering a certain amount of "neglect," especially in the opportunities offered to recruits. However, I feel the authorities responsible have a difficult job in offering something competitive to comparable civilian occupations. The tone of G. Sandys-Lumsdaine's letter makes me wonder how graciously he would accept an increase in his income tax to provide the Treasury with sufficient remuneration to make good this "neglect."

Secondly, he appears to find my letter "offensive" to the Editor and the previous correspondents, yet almost in the same breath refers to "Potential Gangsters," no doubt following the example of S/L. Ash and "One of the Few," with their "Mongrel-brothers, Kennel-mates, Huns," etc. I would hardly think this childlike "catcalling" is likely to foster the spirit required to build a peaceable and economically stable Europe.

G. Sandys-Lumsdaine also appears to be extraordinarily ill-informed regarding the state of affairs in Europe at present, and it apparently has not occurred to him that, in the event of aggression from the East, a German ally would be invaluable to the Western Powers.

Prompted by current correspondence in *Flight*, I have recently received a very interesting letter from an ex-Luftwaffe bomber-pilot. This German pilot realizes that very few British pilots would feel well disposed towards ex-Luftwaffe personnel flying again, powered or not, but he finds it not at all in keeping with our national character for the correspondents in *Flight* to be using the previously mentioned "catcalls," especially as he has been working for a R.A.F. squadron in Germany for the last two years and found an atmosphere of understanding prevalent there.

Let us forsake this "un-British" attitude towards Germans and Germany (after all, the war criminals have been tried and sentenced) and aim at building a United Europe for Peace. According to a Preston coroner, a similar attitude was recently responsible for the suicide of an Austrian girl in a Lancashire village church! D. M. LAVER, Ex S/L., R.A.F.

Guildford, Surrey.

Royal Air Force and Naval Aviation News and Announcements

DE HAVILLAND SURVEYOR might be an apt interpretation of the squadron letters on this Mosquito P.R. 34, banking to show its multiple camera installation, and swollen fuselage for increased tankage.

SERVICE AVIATION

R.A.F. Appointments

IT has been announced by the Minister of Defence that the appointment of Air Marshal Sir William Elliot, K.B.E., C.B., D.F.C., as Chief Staff Officer to the Minister, and Deputy Secretary (Military) to the Cabinet (*Flight*, December 2nd, 1948) will take effect from April 19th. He succeeds Lieut.-Gen. Sir Leslie Hollis, who becomes Commandant-General, Royal Marines. Sir William's present duties as Air Officer Commanding Fighter Command, will be taken over by A.V-M. Sir Basil Embry, K.B.E., C.B., D.S.O., D.F.C., A.F.C., who was Assistant Chief of Air Staff (Training) from January 1st, 1947, to October 19th last. He had previously been Director General of Training since November, 1945. A.V-M. Sir Basil Embry, whose awards include the D.S.O. and three bars, entered the R.A.F. in 1921; on the outbreak of war in 1939 he was serving at the Air Ministry at the Directorate of Operations, but soon took over command of a bomber squadron. Sir Basil, who participated extensively in flying operations during the war, is President of the R.A.F. Escaping Society.

With effect from March 3rd, A.V-M. E. B. Addison, C.B., C.B.E., has been appointed Director-General of Signals at the Air Ministry. A.V-M. Addison, who has commanded No. 90 Group since April, 1946, was responsible for the operational application and co-ordination of all radio counter-measures to assist our aircraft during the invasion of France. His successor at 90 Group is A. Cdre. R. G. Hart, C.B., C.B.E., M.C., who receives the acting rank of Air Vice-Marshal. A.V-M. Hart has been Director of Technical Policy at the Air Ministry for the past year; he became Chief Signals Officer at A.E.A.F. Headquarters in November, 1943, and received a similar appointment to S.H.A.E.F. Main Air H.Q. the following year.

Cadet on V.I.P. Tour

THE Inspector-General of the R.A.F., Air Marshal Sir Leslie Hollinghurst, K.B.E., C.B., D.F.C., who was due to leave Northolt yesterday for a tour of R.A.F. stations in the Middle and Far East, offered to take an A.T.C. cadet with him in the aircraft. Reserve Command asked all its groups to nominate cadets, and the choice fell upon Cadet Sgt. G. Forteath, from No. 1143 Portobello, Edinburgh, Squadron, nominated by No. 66 (Scottish Reserve) Group.

Coastal A.O.C's Scottish Tour

RECENTLY appointed A.O.C.-in-C. Coastal Command, Air Marshal J. W. Baker, C.B., C.B.E., made his first tour of Scottish stations in his Command on January 12th and 13th. Arriving at Edinburgh by train, he was met at Queensferry by A.V-M. D. V. Carnegie, Senior Air Force Officer Scotland and A.O.C. No. 18 Group. His first visit was to Area Joint Combined Headquarters at Pitreavie Castle, Dunfermline, where he met Group staff officers and saw "synthetic" training exercise in progress in the underground Operations Room, from which *Exercise Dawn* was controlled last summer.

At Leuchars, later in the day, he was received by a guard of honour and the station pipe band. In the course of a tour of the station, he talked with aircrews of No. 120 (G.R.) Squadron and inspected some of their Lancasters. That evening he was guest of honour at a dinner-party given by A.V-M. Carnegie at his Burntisland residence. On the following day, Air Marshal Baker flew from Donibristle to R.A.F. Kinloss, where he inspected the station and the Operational Conversion Unit, returning South by air.

Police Appointment for A.V-M

AIR VICE-MARSHAL R. GRAHAM, C.B., C.B.E., D.S.O., D.S.C., D.F.C.,, has been appointed Commandant Designate of the proposed Scottish Police College to be established at Upper Butlaw Camp, Port Edgar, near South Queensferry. The College will provide for the training of recruits to all Scottish police forces, and courses for senior officers. A.V.-M. Graham's last appointment before retirement was Air Officer Commanding the R.A.F. Mission to Australia and New Zealand.

Balliol's 450 m.p.h. Dive

THE Merlin-powered Boulton Paul Balliol 2 was recently dived from 10,000ft during its preliminary trials, now almost completed, and a speed of over 450 m.p.h. was recorded. Besides confirming the general robustness of the aircraft, the dive was an exacting test of the soundness of the Balliol's unusually large cockpit hood, which covers two side-by-side occupants. Unlike the turboprop-powered Balliol 1 (Armstrong-Siddeley Mamba) and the earlier P-108 (Bristol Mercury), the Balliol 2 was constructed from the beginning as a two-seat trainer; the earlier three-seat layout

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has now been dropped. Comparative side-by-side trials of the Mark 2 versions of both Balliol and Avro Athena (also Merlin) are due to begin shortly at Boscombe Down.

R.A.F. Benevolent Fund

RECENT contributions to the Fund include £50 from Saunders-Roe, Ltd., of Cowes, and £19 from the B.S.A.A staff at Langley Airfield in memory of A. Cdre. H. G. Brackley, formerly chief executive of the Airways, who was drowned last November at Rio de Janeiro.

No Accidents

THE R.A.F.'s monthly accident return sheet for November showed that 2,969,000 passenger miles were flown without any accident involving death or injury.

Advice from the C.A.S.

MARSHAL OF THE ROYAL AIR FORCE LORD TEDDER, speaking at the annual dinner of the Chartered Accountants Students' Society in London on January 12th, said that if young men went into the R.A.F. for what they could get out of it, his advice to them was: "Get out before you get in." The C.A.S. did not believe, however, that such an attitude was typical of the younger generation—"I have come to the conclusion that they are a darned sight better than my generation was."

Nene-Vampires for R.A.A.F.

MELBOURNE reports said recently that Australian-built Vampires, with Rolls-Royce Nene turbojets installed, were expected to replace R.A.A.F. Mustangs during next March.

43 Squadron Revival

THE re-numbering of No. 266 Squadron, R.A.F., as No. 43 Squadron, announced in *Flight* of December 9th, will take place on February 11th. On that day a ceremony will be held at Tangmere at 11.30 a.m., at which the Commander-in-Chief, Fighter Command (Air Marshal Sir William Elliot), will present the 43 Squadron badge to the Squadron Commander (S/L. D. L. Harvey) and receive the 266 Squadron badge; later in the ceremony the 266 badge will be handed over to S/L. E. Wootten, the Commanding Officer of No. 245 Squadron.

Marshal of the R.A.F. Lord Douglas of Kirtleside, who was the first Commanding Officer of No. 43 Squadron on its formation in 1916, will inspect a guard of honour and give an address. It is hoped that among other first world war members of the Squadron present will be Air Marshal Sir Alan Lees, A.O.C.-in-C. Reserve Command, Lord Balfour of Inchrye, and Air Marshal Sir L. H. Slatter (former A.O.C.-in-C., Coastal Command), who commanded No. 43 Squadron in 1930. Representatives from the Northern and Southern Rhodesian Governments have also been invited. Any officer or airman ex-member of No. 43 Squadron wishing to attend the ceremony should notify W/C. G. S. A. Parnaby, O.B.E., R.A.F., Tangmere, Chichester, Sussex, as soon as possible.

No. 43 Squadron has a distinguished record in both world wars. It was formed at Stirling in April, 1916, and the following January crossed to France, where it pioneered "ground strafing." Early in 1918 two of its pilots performed the feat of shooting down six enemy aircraft in one day. The Squadron was disbanded in 1919, having destroyed 110 enemy aircraft. In 1925 the Squadron was reformed, and moved to Tangmere the following year. Equipped with Gloster Gamecocks, "Forty-three" soon developed a high reputation for aerobatics and formation flying, and at the 1930 Hendon air display gave the first demonstration of "tied-together" aerobatics, the wing tips in each flight being linked with elastic ropes. At the outbreak of the second world war 43 Squadron was flying Hurricanes, and spent several months countering enemy raiders attacking North-Eastern England. It returned to Tangmere to help cover the Dunkirk evacuation, and was active during the first phases of the Battle of Britain. After another spell in the North-East, it again returned to Tangmere and took part in the Dieppe combined operation. In 1942 the Squadron, flying Spitfires, moved to North Africa. After the African victory it became part of the Desert Air Force, operating over Sicily, Salerno and Anzio, and also took part in the invasion of Southern France. From late 1944 until the end of the war the Squadron remained in Italy, and was finally disbanded at Treviso in 1947, having destroyed 159 enemy aircraft.

STAND EASY: Air Marshal Sir J. W. Whitworth Jones chats with eight newly-commissioned W.A.A.F. officers. He took the salute when the second course passed out from the O.C.T.U. at Hawkinge last week.

R.A.F. Regiment (Malaya)

AFTER four months of active operations against bandits in Johore, No. 91 Squadron, R.A.F. Regiment (Malaya) has returned to Changi, Singapore, for aerodrome defence duties. The Squadron operated in the Segamat, Kota Tinggi

RE-INCARNATION: (Inset). The badge of No. 43 Fighter Squadron, which, as related on this page, will be presented to S/L D. L. Harvey in exchange for the badge of his present command, 266 Squadron, when "43"—an old established unit—is recalled to service on Feb. 11th. The Squadron's motto reads "Gloria Finis" (Glory is the end). Present ground crews of No. 266 Squadron are shown on right, with the Squadron's Meteor 4s lined up on the airfield at Tangmere.

"Flight" photograph.

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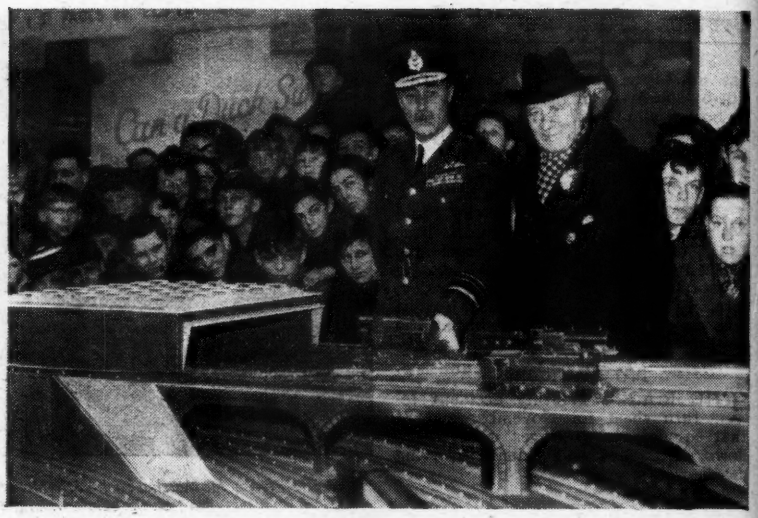
and Mersing areas, travelling some 1,500 miles over little-known jungle tracks. The airmen supported themselves for days on end, sometimes assisted by supplies dropped from the air. Frequently their only contact with the outside world was by radio. With the Squadron was a section of specially trained jungle trackers to lead the chase after bandits in all deep penetrations of the jungle.

Among the highlights of the campaign were the overtaking, after a 12-mile pursuit, of bandits who had ransacked a saw mill at Kota Tinggi, and the recovery of all the looted stores, and operation "Swansong"—a six-day search, aided by air reconnaissance, of an area of thick jungle between Kota Tinggi and the coast. In a farewell message to the Squadron on leaving his command, Brigadier R. C. O. Hedley, Commander, Johore Sub-District, said: "No. 91 Squadron has done an extremely difficult job excellently, often under the most trying conditions. I am proud to have had your Squadron serving under me, and shall look forward to the time when you may do so again."

A Request from Sweden

DURING the war some hundreds of allied airmen, mostly belonging to the R.A.F. or the Dominions Air Forces, who came down on Swedish territory or in Swedish waters, were interned in Falun and the surrounding district. They were allowed to move freely in the town and many friendships were formed between them and the inhabitants. The editor of the *Dala-Demokraten*, the daily newspaper published in Falun, states that many of the townspeople would be glad to renew these friendships and to know how the ex-Falun airmen have fared since their release from internment. The newspaper would welcome news of them for publication. Among those from whom the editor hopes to hear are members of the R.C.A.F. who were interned in Falun, some of whom took part in the ice-hockey matches there.

Swedish regard for the R.A.F. was warmly demonstrated last May, on the occasion of No. 65 Squadron's good-will visit.



SIGNAL OCCASION : Air Marshal Sir Arthur Sanders, K.B.E., C.B., the recently-appointed Vice-Chief of Air Staff, deputised for Lord Tedder at the Schoolboys Own Exhibition, which closed on Jan. 15th. He is seen with Sir Harry Brittain at the British Railways stand.

R.A.F. Permanent Commissions

GENERAL DUTIES BRANCH.

Squadron Leaders: A. J. Douch, R. A. Innes, O. E. Simpson.

Flight Lieutenants: H. T. Brown, D.F.C., E. H. Burgess, D.F.C., K. O. Chamberlain, D.F.C., R. H. Chapman, F. W. Cox, D.F.C., J. Crampton, D.F.C., L. V. Craxton, F. W. Doherty, J. P. C. Dow, E. A. J. Haskett, D. R. Hobdey, J. H. Lacey, D.F.M., R. G. Milton, K. B. Orr, H. Pears, D.F.C., L. J. O. Prudence, A. P. Richardson, K. Russem, G. H. Tasney, D.F.C., D. R. West, D.F.C., E. R. Williams, D.F.C., A. Yates.

Flying Officers: F. M. A. Baker, H. J. E. Braddick, R. J. Dench, K. R. Rosewell, B. Sherwin.

TECHNICAL BRANCH.

Flight Lieutenants: G. C. Brown, K. E. Christensen, W. Edwards, S. T. J. Hampson, E. W. Hassall, I. J. Herdman-Smith, L. T. V. Kelly, F. P. Thompson.

Flying Officers: A. E. Hough, R. H. Smith.

EQUIPMENT BRANCH.

Flight Lieutenants: L. S. Glue, J. C. Harris-Ward, D.F.C., W. J. Waugh.

Flying Officers: C. T. Kilgannon, T. K. Rourke, C. T. Vaughan.

SECRETARIAL BRANCH.

Wing Commander: R. M. Coad, A.F.C.

Squadron Leaders: G. D. Edwards, H. S. Mapp, P. P. Pryse.

Flight Lieutenants: A. S. Holgate, D. J. Park, D.F.M., E. G. Taylor.

Flying Officers: R. J. M. Baron, J. W. H. Case, J. W. Shepherd.

R.A.F. REGIMENT.

Flying Officer: M. O. Thompson.

Pilot Officers: G. Henderson, E. P. Ledlie.

MARINE BRANCH.

Flight Lieutenants: W. Davison, B. Dill, R. P. Wheel.

DENTAL BRANCH.

Flight Lieutenants: G. T. Crook, L.D.S., W. B. McStay, L.D.S., R. W. Roberts, L.D.S.

PROVOST BRANCH.

Wing Commander: R. V. Roberts.

Squadron Leader: C. A. J. Palmby.

Flight Lieutenants: H. D. Bailey, E. J. Walker.

SUPER-SCREW : An impressive feature of the Westland Wyvern TF1 as it taxies out is its eight-blade Rotol contra-rotating airscrew, designed to absorb the 3,500 h.p. of the 24-cylinder, flat-H Rolls-Royce Eagle engine.

Reunions

THE second Reunion dinner for all ranks and all sections of R.A.F. St. Mawgan (Transport Command), including satellites and outposts, will be held on Saturday, April 9th, at the Aldwych Brasserie. Details from A. Wilson, 37, Rectory Gardens, Hornsey, London, N.8.

* * *

All ranks of all services who were stationed on the Cocos Islands during the 1939-1945 war are invited to attend a reunion at the Victory Club, Seymour Street, Marble Arch, at 6.30 p.m. on Friday, March 11th, 1949. Tickets, 10s each, and details from the organizing secretary, Cocos Islands Reunion, Air Ministry, 312, Bush House (S.E.), Strand, London, W.C.2.

* * *

A Reunion for officers past and present of No. 54 Squadron will be held at R.A.F. Station, Odiham, on Saturday, February 19th. Those desirous of attending should contact: The Adjutant, No. 54 Squadron, R.A.F. Odiham, Hampshire.

* * *

The second Reunion of No. 547 Squadron, and No. 8547 S.E., will be held late in March. Details from F/L. J. W. A. Daley, R.A.F. Defford, Worcester

* * *

A Reunion is proposed for No. 30 Squadron (Ceylon, India and Burma), to be held in London early this year. Interested ex-members should contact J. C. Perkins, 13, Berscharbro Road, London, S.E.2.